The Builder.

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The Strength of Beams and Columns of Wood, Iron, and Steel.

IT would seem that the "architects" of the present day have left the study of the scientific branches connected with construction entirely to the "engineers;" at least, we may infer that such is the case from the fact that the books which appear in such numbers on the strength of materials and other cognate subjects, are produced by members of the *engineering* profession, to the almost complete exclusion of those of the *architectural*. Time was when the "architect" was a man of science; that is to say, he was well versed in all the problems connected with laws of force as far as they were then understood; but in the present day, when science has advanced with such rapid strides, the architect is quite left behind, and appears satisfied with a mere smattering of mechanical or any other mathematical science. This state of things will go on until the more advanced members of the architectural profession see the necessity of compelling their pupils to go through a severe course of mathematical study before they are allowed to practise; otherwise they must not expect that their profession will be regarded as a scientific one by those who are competent to judge of such matters.

But, although architects will rarely take up scientific pursuits themselves, they are very glad to avail themselves of the investigations of those who do so; and, consequently, there is a demand for books in which they can find rules for the strength and proper proportions of beams, columns, &c., ready to their hand, without the trouble of examining and testing for themselves the *formulæ* or processes of reasoning by which they are obtained. The book* which Mr. Baker has produced, and of which we now propose to give an abstract (as far as it relates to subjects interesting to the architect) is one that will be of immense service to the student of building construction, as the methods of calculation are very fully explained, and can be worked out with but little use of algebraical *formulæ*; the author having "endeavoured to assimilate the process of investigation to the ordinary routine of the drawing office; in other words, he has preferred compasses to equations, and scales to logarithms, whenever the selection was optional."

The student, however, must not jump to the conclusion that there is no need for him to acquire a considerable knowledge of mathematics, for he will find that the whole of the reasoning throughout the book is what may be termed "mathematical," although without any extensive use of the symbols which are supposed to be inseparable from that science; and unless his mind has been well trained in habits of close reasoning, he will find much difficulty in understanding the greater part of the work.

The object which our author has had in view has been to derive "methods of ascertaining the practical strength of any given section of beam, column, or arch, in cast-iron, wrought-iron, or steel;" and to show how the various data obtained as the results of the numerous experiments which have been made on those materials can be utilised for that purpose.

In testing the strength of a beam supported at each end, the best mode of proceeding is to apply a gradually increasing bending stress at the centre, the deflection and set being noted after each increment of stress; and to find the real value of the material we must know the *work done* in producing fracture, and this will be proportional to the product of *ultimate tensile resistance* and of *ultimate extension*, the toughest and best material giving the highest result if compared with others on that system. It is also requisite in judging of the quality of metal by experiment, to consider the *form* under which it is presented, as "by injudicious shaping the best material may be reduced to the level of the worst."

It has been shown by Mr. W. H. Barlow that there exists in beams an element of strength which he calls "resistance of flexure." Experiments upon beams which have the *web* small in proportion to the *flanges*, demonstrate that the law of *the strain being proportional to the load applied* is a tolerably accurate one; but that in beams of rectangular section the error arising from calculations made on that principle is very great. This error arises from the effect of *lateral adhesion* of the material being left out of consideration; but experiment shows that a powerful lateral action exists tending to modify the effect of unequal strains. This new *resistance* is dependent on the deflection in connexion with the depth of the metal, and is uniform for each unit of area over the whole cross-section; being due to the elastic reaction of the contiguous fibres, which will be a constant amount throughout the whole depth of the beam; the extension and compression of the several fibres being proportional to their several distances from the *neutral axis*.

The value of the *ultimate resistance* of the fibres is consequently always higher than the *resistance to direct tension* of the material; the quantity to be added being variable, and dependent upon the form of section. Its value, however, can be found for iron beams of any form of section, by help of the experiments which have been made on solid bars of the same kind and quality of metal.

The *moment of resistance* of a given cross section is the area of a flange multiplied by the depth of the beam, or the *effective* area multiplied by the *effective* depth. The *moment of the weight*, or strain, is the bending-force multiplied by the length of leverage at which it acts; and if this last moment is divided by the *moment of resistance*, we obtain the value of the resistance of the section to the same straining force. When the load is all at the centre of the beam (supported at each end), the *moment of the weight* is one-half the load multiplied by one-half of the span, that is, one-fourth of the product of span and load; if the load is equally distributed along the beam, the *moment* is half the above quantity, or one-eighth of the product of span and load. The value of the *moment of resistance* of a given cross section is determined on the supposition that every fibre is strained according to its direct distance from the neutral-axis, and that the effective leverage is also proportional thereto. On this principle it is easily shown that the *moment of resistance* of a square section having a side vertical is one-sixth of the cube of the side. If the diagonal of the square section is placed vertical, the *moment of resistance* is the same as before, but divided by the square-root of 2, or 1·414. In beams of any other section we must first find the position of the centre of gravity of the section, as through it the neutral-axis will pass. In a beam of T section, having equal thickness of metal throughout, the *moment of resistance* is half the square of the distance of the neutral-axis from the bottom of the T, multiplied by the thickness of the metal.

The variation in the strength of various specimens of cast-iron that have been experimented on amounts to 100 per cent., and it is generally found that remelting increases its strength. As an average of the experiments made on ordinary cast-iron, the ultimate resistance to direct tension may be taken as 16,502 lb. per square inch of section. A bar 1 in. square, having a bearing of 54 in., is found to have a breaking-weight of 464 lb. in the centre, the moment of which is 6,264; the *moment of resistance* is one-sixth the cube of the side; that is, $\frac{1}{6}$ in.: therefore, if we divide 6,264 by $\frac{1}{6}$, we get 37,584 lb. as the *apparent* resistance excited by the above load in a square cast-iron rod. Deducting from this last result the value (16,502) of the ultimate resistance to tension, we obtain the quantity, 21,082 lb. as the value of Mr. Barlow's *resistance due to flexure*; so that the *resistance due to flexure* is to the *resistance to direct tension* as 100 to 78.

It is shown, both by theory and experiment, that the nearer the centres of gravity of the portions of the cross section which are above and below the neutral-axis approach thereto, the higher is the value of the *resistance due to flexure*; so that in girders where the centre of gravity is near the extreme points of depth, the value of that *resistance* is very small, and may be practically neglected in the calculation Suppose it is required to find the section of a girder 12 in. deep, having a span of 16 ft., or 192 in., which shall carry a load of 10 tons at the centre, the strain per square inch of section not exceeding 2 tons; the *moment of the weight* is half the load multiplied by half the span (in inches), or 480; the *moment of resistance* is the area of the flange multiplied by the depth of the girder; and the resistance of the section being 2 tons per inch, we find the area of the flange to be 480 divided by the product of the depth (12 in.) and the resistance (2 tons), giving 20 in. for the area of the section of the flange. The area of flange of any other beam of given depth, span, and load, can be found in a similar manner by multiplying one-fourth of the span (in inches) by the load in tons, and dividing the product by *twice* the depth (in inches); the strain per square inch of section being 2 tons. Conversely, the area of section of flange of a cast-iron girder being given, together with the depth and bearing of the beam, the weight to be laid on the centre can be determined for any given strain per square inch of section: thus, multiply together the area of flange, the depth of the beam, and the given strain per inch, and divide the product by one-fourth the span, all dimensions being expressed in inches, and the weights in tons.

Wrought-iron is found to vary very greatly in tensile strength, the difference between several specimens being upwards of 90 per cent. The tensile strength of plate-iron is from 14½ tons to 28 tons per square inch; and in bars, the ultimate resistance to tension is from 19½ tons to 30½ tons per square inch. It is found in practice that the elastic resistance of the metal is overcome by about the same amount of strain per square inch, whether in compression or in tension, and on this account some engineers make the two flanges of a wrought-iron beam equal, although the usual plan is to give 20 per cent. more to the top (which suffers compression), than to the bottom flange, which suffers extension. The ultimate resistance to compression of a cube of wrought-iron may be regarded as practically

* On the Strengths of Beams, Columns, and Arches. By B. Baker, Assoc. Inst. C.E. E. & F. N. Spon, London. 1870.

unlimited; consequently, as in cast iron, it is only necessary to consider tensile strains. The mean tensile strength of Swedish bars, 2 in. square, is 42,133 lb. per square inch; and their breaking-weight at the centre of 25 in. bearing 14,000 lb. The *moment of this weight* is half the bearing multiplied by half the weight, or 87,500; and the *moment of resistance* of a cross section is one-sixth of the cube of the depth, or 1⅓. Dividing the former by the latter, we get 65,625 lb. as the *apparent strain* on the extreme fibres caused by the breaking weight; from this quantity subtract the tensile strength above given, namely, 42,123 lb., and the difference is 23,492 lb., representing the *resistance due to flexure*, which has been previously described. In wrought-iron bars, therefore, this resistance is rather more than one-half the tensile strength, amounting in bars strained with one side of the square vertical, to nine-sixteenths of the tensile strength, and in those with the diagonal of the square section vertical, to thirteen-sixteenths of the tensile strength. In beams of an I or H section the *resistance due to flexure*, is small, and can be found by multiplying the tensile strength, 42,133, by nine-sixteenths of the thickness of the web, and dividing by the width of the flange.

As an example we take the case of a beam of this section ½ in. thickness of metal, which was laid with 48 in. bearing, and the breaking-weight found by experiment to be 6¼ tons. Taking the tensile strength at 22 tons per square inch, and multiplying it by nine-sixteenths of one-third, or three-sixteenths, and then dividing by 2·86, the width of the flange, we get 1·4 tons as the value of the *resistance due to flexure*; and therefore the *apparent resistance* is this last quantity added to 22, or 23·4 tons. Now, the area of flange multiplied into the depth of the beam being 3·24, the breaking-weight is calculated by multiplying 23·4 into 3·24, and dividing by one-fourth of the bearing, which gives 6·3 tons for the breaking-weight, or the same amount as obtained by experiment. The above example may be easily generalised into a rule for finding the breaking-weight of a wrought-iron beam of the same form of section, namely, divide three-sixteenths of the ultimate *tensile strength* per square inch of metal by the width of the flange, and add the quantity thus obtained to the said tensile strength; then multiply the last *sum* by the product of the area of the flange into depth of beam, and divide by one-fourth the bearing; the result is the breaking-weight of the beam in the middle, all the weights and strains being expressed in tons, and the dimensions in inches. If, instead of the breaking-weight, it is required to know what load the beam will bear in the middle, when the *ruling strain* is some fixed amount, such as 5 tons per square inch of section, we have only to substitute 5 tons for the ultimate tensile strength in the above calculation.

The following is the rule for finding the load in tons that may be laid on the middle of a beam of T section so that the fibres may be strained to a given amount, say 5 tons per square inch: multiply 5 times the area of the vertical web by half the depth of the beam, and divide by one-fourth of the span; all dimensions being in inches. For example, let a beam of this form be 3 in. deep, 3 in. wide, and ½ inch thick, the bearing being 60 in.; then the area of the web is 1½, the half depth 1½, and 5 times their product divided by one-fourth of 60 gives ·62 ton as the load in the middle that will produce a strain of 5 tons per square inch of section. The strength of T beams of wrought-iron can also be found in the manner described for cast-iron girders of the same form.

The great improvements recently introduced in the manufacture of steel are rapidly causing its substitution for common iron as the material of beams and railway bars. The quality of this material is greatly affected by the different modes of treatment which it undergoes in manufacture. Thus a specimen of cast-steel highly heated and cooled in oil bore 96 tons per inch, whilst a similar piece cooled in water failed with 40 tons, and another cooled slowly in ashes with 54 tons. Moreover, the resistance to *steady* tensile strain increases with the hardness of the steel, but at the same time there is a diminution in its power of resisting a blow.

The resistance to impact was 20 per cent. higher in the last of the above-named specimens than in the first, although the ultimate tensile strength was 44 per cent. less; and the same rule holds good in all kinds of steel. The mean tensile strength of Bessemer steel plates is double that of good iron plates, or about 40 tons per square inch; that of bars is still higher, being about 51 tons per inch. The rate of elongation varies inversely as the cube of the ultimate resistance to tension.

The resistance of short columns of steel to compression is practically unlimited; 98 tons per square inch having only produced a depression of 36 per cent.

From experiments upon various kinds of steel, it is found that the *resistance due to flexure* is from six-tenths to eight-tenths of the *ultimate resistance to direct tension* in square bars having the side vertical.

The following is the calculation of the strength of a steel rail of I section:—5 in. deep, ⅛ in. thickness of web, 2½ in. width of flange: the *moment of resistance* of the cross section is 7·8; the average resistance to direct tension, 45 tons; and the *resistance due to flexure* is taken as ⅔ of that to direct tension for a solid bar: but since the thickness of the web is to the width of the flange as 11 to 40, the *resistance due to flexure* for this section is ⅔ of 11, multiplied by 45 and divided by 40,—that is, 9·27 tons. Hence, the *apparent resistance* is 9·27 added to 45, or 54·27 tons. The ultimate breaking-weight at the centre of this beam, with a bearing of 43½ in., is found by multiplying the apparent resistance, 54·27, by the moment of resistance of the section, 7·8, and dividing by one-fourth of the span, which gives 38·9 tons.

The *stiffness* of a beam is its power of resistance to bending; so that if a beam, supported at its two ends and loaded in the middle, deflects from its original position before being loaded, the amount of that deflexion will indicate its *stiffness*; that is to say, the smaller the deflexion for a given load, the greater the stiffness of the beam. Hence it is said that the *stiffness* or *resistance to deflexion* is inversely as the *amount* of deflexion.

The laws of stiffness in beams are very different to those of strength or resistance to fracture. It has been generally assumed that the deflexion is proportional to the stress producing it; but this is not strictly true for any material, and in cast-iron the deviation from that law is found to be considerable under every degree of strain. In deducing a rule for finding the deflexion of a beam under a load not exceeding the *elastic limit*, we shall obtain a sufficiently near result if we take an average of the elongations and depressions produced by experiments, without complicating the question by considering the varying rates of deflexion under successive increments of load. We find that the mean result of experiments on pulling and thrusting bars of cast iron, 1 in. square and 50 ft. long, for the first three tons' stress is ·00018 per ton for each unit of length. Hence we obtain the following rule for the deflexion of a cast-iron beam of any symmetrical form of section, loaded at the centre to any extent within the elastic limit; multiply the tensile strain per square inch of section which the load produces into the square of the span, and also into the fraction ·00003, and divide by the depth of the beam; all dimensions being in inches, and the strain in tons. The ultimate direct tensile strength of cast iron is generally taken at 7 tons per square inch of section.

The deflexion of wrought-iron beams can be found in a similar manner, but since the resistance of this material to extension is greater than that of cast-iron, the deflexions with equal loads are less. As the result of numerous experiments, the extension of wrought-iron bars in terms of their length, within the *elastic limit*, which varies from 8 to 12 tons per square inch of section, is generally taken at ·0001 per ton, that is, the extension is $\frac{1}{10000}$ of the length for each ton per square inch of direct tensile strain. It is also shown by experiment that the effective rate of extension per ton for every square inch of *apparent* strain, is constant for beams of every form of cross section, when subjected to transverse strain; and that the extension of fibres under similar apparent unit strains is unaffected by the agency exciting those strains. The deflexion of any wrought-iron beam of uniform section, under a central load, when strained within the elastic limit, is found by multiplying the square of the span into the strain per square inch of section, and dividing by the depth; the result multiplied by the fraction ·000017 gives the deflexion; all dimensions being in inches, and the strain in tons.

The *stiffness* of steel is greater than that of either cast or wrought iron, but the deflexion of a steel beam, under a given load, can be found with sufficient accuracy by a rule similar to those given for iron, the only difference being in the constant multiplier. For average qualities the mean extension of a bar, 1 inch square for each ton of strain, is found to be ·00008, or $\frac{1}{12500}$ of its length, and the same result is obtained by experiments on beams laid between supports, and subjected to a transverse strain. This is four-fifths of that obtained in wrought-iron, or the relative stiffness of steel and iron beams of similar section is as 5 to 4. Hence we obtain the following rule for the deflexion of a steel beam of uniform section, loaded in the middle to any extent within the elastic limit; the square of the span, multiplied into the strain, in tons, per square inch of section, and divided by the depth of the beam, the result being multiplied by the fraction ·0000133, gives the required deflexion, all dimensions being in inches.

Wood, as a material for beams, is now made to play a very subordinate part in large engineering structures; but as it still forms an important material in architectural works, it is necessary that we should have correct data on which to ground our calculations of its strength and stiffness. Experiments made upon small pieces of wood of selected quality are found to give much higher results than those made upon large pieces such as are commonly used in practice. Taking average specimens of pine and oak of ordinary scantlings, we find that the breaking-weight reduced to that on a bar 1 in. square and 12 in. long, loaded in the middle, is 2·2 cwt. for pine, and 2·75 cwt. for oak. Hence we obtain the following simple rule for the breaking-weight of a beam at the centre; multiply the square of the depth into the breadth, and divide by the span; then multiply the result by 1·65 for oak, and by 1·32 for pine, and you have the breaking-weight in tons at the centre, all the dimensions being in inches. The ultimate strength of these beams may be also found by putting 2 tons per square inch for pine and 2½ tons for oak in the rules previously given for the strength of iron beams; these being the ultimate strains per square inch of section which the fibres will bear.

The *stiffness* of beams of wood may also be determined in the same way as for those of iron, the average elongation of a bar of oak or pine being ·0022 and ·003 of its length per ton per square inch respectively. Hence we find the deflexion for any load at the centre, straining the beam with any force per square inch of section within the elastic limit, by the same rule as for iron beams; namely, multiply the given strain in tons per square inch into the square of the span, and divide by the depth; the result, multiplied by ·00037 for oak, and by ·0005 for pine, will give the amount of deflexion at the middle of the beam; all dimensions being in inches. The practical difference in strength and stiffness of oak and pine is not great, where beams of large scantlings are employed; oak being one-fourth *stronger* and one-third *stiffer* than pine.

When any portion of a structure has to support a weight acting vertically down its axis, it may be considered as a *column*. The strength of a column, or its resistance to pressure acting in the direction of the axis, depends very greatly on the relation between its length and diameter; a flat piece of material, even if it be of soft wood, will bear an almost unlimited pressure, which reduces its thickness, but at the same time increases its hardness. In order, therefore, to test the real resistance of material to a crushing force, the height must not be less than 1½ times the width at base; in pieces of cast iron of this form, the average resistance to crushing of good metal is 49 tons per square inch of section, and in wrought iron about 16 or 18 tons; the compressive strength of mild steel is about 1¼ times that of the best wrought-iron, and that of fine-tempered steel about three times that of iron.

In the experiments on the compressive strength of various woods there are great discrepancies; so much depending on the degree of seasoning, as moisture facilitates the failure of wood by splitting. The resistance of elm is 92 cwt. per square inch; that of English oak, 90 cwt.; of American oak, 67 cwt.; and of pine, 54 cwt.; but the strength of all will vary according to the dryness of the specimens.

In columns having a length amounting to several times the diameter or width of base, the compressive force acting down the axis produces a tension tending to cause failure by bending. The strain, therefore, on a column is partly transverse and partly compressive; where the length is very great as compared with the

diameter, the transverse strain is the principal one to be considered, but there is also an initial compression due to the insistent load uniformly distributed over the cross section, which is sufficient in effect to make the circumstances different to that of a beam strained by a transverse force alone. In columns of which the length exceeds thirty-five times the diameter, experiments show that the influence of resistance to compression is imperceptible, but that below that ratio it must be included in the calculation.

The strain on a column results from two distinct forces; one acting along the axis which is inversely proportional to the area, and the other perpendicular thereto, which varies as the *stiffness* of the material. The former of these forces being the average compression per square inch of section, is the load divided by the area in square inches; and the latter, or the bending force, is proportional to the compression and to the square of the *ratio of the length to the diameter*, and also to the increment of length received within the elastic limits. In this way we obtain, by a comparison of the results of numerous experiments, the following rules for finding the breaking-weight of solid columns having flat parallel ends, the load being laid uniformly over the whole section, and pressing directly down the axis.

To find the breaking-weight in cwts. per square inch of section of round cast-iron columns, add 330 to the square of the *ratio of length to diameter*, and divide 270,000 by the sum. The safe permanent load may be from one-fifth to one-seventh of the breaking-weight obtained by this rule.

To find the breaking-weight in cwts. per square inch of section of round wrought-iron columns; add 2,000 to the square of the *ratio of length to diameter*, and divide 680,000 by the sum. The safe permanent load may be one-fourth or one-fifth of the breaking-weight.

Comparing the results obtained from these rules, we find that when the length is from five to ten times the diameter, a cast-iron column is twice as strong as a wrought-iron one of the same size; when the length is from fifteen to twenty times the diameter, the strength of a cast-iron column is one and a half times that of a wrought-iron one; when the length is from twenty-five to thirty times the diameter, the strength of wrought-iron and of cast-iron columns is about equal; when the length is from thirty-five to forty times the diameter, the wrought-iron column is one-third stronger than the cast-iron one; and when the length is above fifty times the diameter, the wrought-iron column has double the strength of the cast-iron column.

The breaking-weight of square columns of wood, whether oak or pine, is nearly the same, provided the length is over fifteen times the diameter; the rule being, add 350 to the square of the *ratio of length to diameter*, and divide 17,000 by the sum: the result gives the breaking-weight in cwts. per square inch of section. To find the breaking-weight of an oak or elm post less than fifteen diameters in length, multiply the breaking-weight just found for long pillars by 45, and divide by the *ratio of length to diameter* added to 30. The safe permanent load may be from one-seventh to one-tenth of the breaking-weight.

To find the strength of a *round* wooden column, we must first substitute eight-sevenths of the actual *ratio of length to diameter* in the above rule for the true *ratio*, and proceed as before.

To find the strength of a *square* iron column, we must substitute seven-eighths of the actual *ratio of length to diameter* for the *ratio* in the above rules for *round* columns, and proceed as before.

In calculating the strength of hollow columns, the thickness of metal must be considered: when the thickness of the metal is one-tenth the diameter, take three-fourths of the *ratio* instead of the actual ratio in applying the before-mentioned rules: if the thickness is one-seventh the diameter, take four-fifths of the *ratio*; if the thickness is one-fifth the diameter, take seven-eighths of the *ratio*; and when the thickness is one-fourth the diameter, take nine-tenths of the *ratio*.

For finding the strength of columns of L, T, or + sections, the *ratio* must be multiplied by $1\frac{1}{3}$, $1\frac{1}{2}$, $1\frac{1}{2}$, and $1\frac{1}{2}$, to obtain the equivalent ratio in the before-mentioned thicknesses of metal as compared with the diameter; pillars of these last sections being weaker than solid pillars containing the same quantity of metal; whilst hollow columns are stronger than solid ones for the same quantity of metal.

In order to find a rule for the strength of a steel column, we may suppose that if a bar is bent by a force at the middle, and kept so bent by a tie-rod attached to its extremities, the strain on the tie will represent the weight the bar will sustain as a column if set upright and loaded at the top: so that, by aid of the rules for deflexion of beams, we can deduce the value of the elastic reaction, since the strain on the tie is the same as the thrust of an arch having the rise represented by the deflexion, and the load by the lateral stress producing it. Hence we obtain the following rule for the breaking-weight of a *round* steel column in cwts. per square inch of section: for mild steel, add 1,400 to the square of the *ratio of length to diameter*, and divide 840,000 by the sum. For strong steel, add 900 to the square of the *ratio*, and divide 920,000 by the sum. In steel columns of *square* section, the strength per square inch is one-third greater than in round ones. The strength of a long column may be considered as exactly proportional to the stiffness of the material.

WORKS OF ROUBILIAC IN TERRA-COTTA.

IN many former numbers of this journal we have discussed the subject of the capabilities of *terra-cotta* for architectural purposes. We have referred, first, to the great antiquity and permanent durability of burnt earth; then to the use made of this material in Asiatic and in Italian art; and, lastly, to the mode in which the work of the mere decorator rises into that of the sculptor, as is especially the case in the enamelled *Della Robbia* ware.

In investigating the history of ornamental and structural earthenware in this country, we have been struck with the fact, that it is to the sculptor of some of the best marbles to be found in England that we also owe some of our most spirited and instructive specimens of statuary in terra-cotta.

Roubiliac appears to have been in the habit of first working out, in a clay which is not that usually employed for the purpose, those conceptions which he afterwards embodied in marble. Not only did he, like other sculptors, study in a plastic material, but he submitted his sketches to the fire, and has thus left, should they ever be collected together, a most instructive series of his productions in successive stages of perfection.

We are not about here to enter into the question of the proper rank of Roubiliac as a sculptor. By his contemporaries it was unquestioned. By most writers of authority since his time it has been undisputed. Lord Chesterfield said that the Gascon artist was "a true sculptor, while his contemporaries were no more than stone-cutters." Allan Cunningham, by no means given to compliment, calls Roubiliac "a genius and a gentleman." The effect of his works, especially of the terrible "Death" in the Nightingale monument, on the public mind, was extraordinary in his time; nor does it seem to be much less forcible at the present day, if one may judge from observation of the groups that make the tour of the chapels of Westminster Abbey. But, on the other hand, there are men not devoid of taste who sneer at the allegoric conception of certain of Roubiliac's monuments. A word on this subject is therefore not altogether uncalled for, when we refer to the works of this artist in terra-cotta.

The vigorous and energetic protest embodied in the works of Hogarth against the "Goddess and Shepherdess, the Roman Emperor school of portrait-painters and their patrons, the collectors of fiddle-brown saints and ropy-tendoned martyrs, of pseudo-Titians and second-hand Raffaelles," to use the vigorous language of Mr. Redgrave, may perhaps be more fully appreciated in our day than it was in his own. It was the attempt of an original genius to draw its inspiration fresh from nature, when the style of such remains of academic teaching as the century could boast had sunk from the conventional into the simply contemptible. It was a protest such as that which was made by Wordsworth and his school against the followers of Pope; a protest of self-taught genius against classified dulness and incompetence reduced to system. It was, like so many attempted reforms, a work commenced on a low plane. There is an honest and hearty vulgarity about Hogarth which reminds one of the outspoken German of Luther. The English painter saw what was true; he saw how much that truth exceeded the false feebleness of the time. So far he did well; but he seemed unaware that excellence in art requires not only truth, but noble truth. It is not merely nature that should inspire the artist, but nature in her loftiest moods of beauty, of pathos, or of grandeur. Hogarth was a student of nature; he was, moreover, influenced by a sound and well-intentioned morality; but he did not rise to the level of an artist who at once elevates, purifies, and ennobles the soul, by the imaginative representation of the grander aspects of nature.

In the arts of the painter and of the engraver there are, however, different strata of excellence. Hogarth wrought on a low level, but he wrought well on his selected plane. In sculpture the case is altogether different. That severe and lofty art lends her aid with difficulty, almost with shame, to any but the nobler phases of imitative skill. Satyric sculpture, comic sculpture, burlesque sculpture, are pseudo forms of the art; which they caricature as the monkey does the man. We may admire the cleverness shown in the clay figures which grotesquely recall the features of contemporary notorieties, or in the curious monstrosities of Japanese carving. But we look at these things as we do at wax models. We appreciate the talent of their authors, but we cannot regard them as sculpture.

Bearing in mind this limit to the range of the sculptor's province, it is impossible to refuse to Roubiliac the title of a reformer and restorer of taste in plastic art, not less energetic, although far less homely, than Hogarth was in painting. The painter or the draughtsman may, to a very great extent, follow the bent of his own genius. The sculptor works always in fetters. The costliness of the material in which his ideas can alone take their fairest form is in itself a very great barrier against the exercise of original power. In monumental works not only have the tastes and wishes of the family for whom the artist is to toil to be consulted,—frequently as to those questions of size, of locality, of execution in relief or in the round, which the freer pencil of the painter overleaps at a single bound,—but the requirements of the architect often cramp the genius of the sculptor. In some of Roubiliac's larger monuments the bad effect of the architectural requirements of his day may be distinctly traced. Monumental effigies, by the middle of the eighteenth century, had assumed stilted and ostentatious proportions. The modest brass, reminding the worshipper of the dust beneath his bones, and pleading for a prayer for the soul of the departed, no longer recalled the lineaments or the heraldic bearings of the dead. The simple effigy of cross-legged knight, the grand simplicity of the plain coffer-shaped tomb, such as that sacred to the memory of our first Edward,—had given way to the costly frippery of canopies and shrines. To cover with marble panelling as much of the time-stained diaper of a thirteenth-century wall as might assert the importance of the defunct, came to be considered a point of honour among those who could afford the cost of stately monuments. At times an entire chapel was occupied by a ponderous composition, as in the case of the weeping Virtues that watch the last repose of Lodovick Stuart, Duke of Richmond, and the substantial Fame that is perched upon the floriated metal canopy over his head; or the corresponding bronze tabernacle dedicated to the excellence of Villiers, Duke of Buckingham. It was not enough that Allegory should be made to bear false witness over the tomb. Portraiture was equally corrupted. One of the finest marble statues in London, that of William III. in the hall of the Bank of England, represents that Dutch warrior in the armour of a Roman general, with bare legs and buskins; or, at least, in such a conventional representation of Roman armour as suited the uncritical notions of the time. Sculpture, like painting and poetry, had passed, by the commencement of the eighteenth century, into a pseudo-classic, melo-dramatic, stage; and the representations of the flowing wigs that assumed their fullest proportions when the long and curling locks of Louis XIV. had been replaced by the productions of the hair-dresser, were almost the most unartificial part of the attire rendered historic by the sculptor. Vanity called on subservient art to represent great men as heroic. The only result was that they were drawn like the heroes of the stage.

Against this apotheosis of toad-eating and bad taste, Louis François Roubiliac entered a sculptor's protest. He could not suddenly or altogether purify a depraved public taste; but he did all that was possible to exalt and ennoble it.

He could not control the vain and tasteless desire to occupy large wall-surfaces by the accidents of monumental luxury; but he detached, as far as possible, his own design,—the actual sculpture,—from the pyramid, or obelisk, or storied tablet, that formed the heavy and incongruous background demanded by the fashion of the times. He could not throw aside the aid of allegory; for monumental sculpture which should not allegorically praise the virtues of the departed would have found few admirers, and no purchasers, in his day. But he reduced the allegorical features of his designs within the limits of poetic, or rather artistic, licence. Time and Death, the two great conquerors of mankind, —Strength, Wisdom, Eloquence—the Muse of History,—such were the accessory figures which he introduced into his well-balanced groups. In portraiture he was truthful and exact, with a fidelity to costume which might even be termed mechanical, were it not for the pictorial grace with which he disordered the attire proper to his subjects. And when we turn from those larger and more complicated monuments in which, executed as they were at the public expense, the sculptor was most fettered by the public taste of his day, to the busts and single statues of Roubiliac, we know not whether most to admire the truthful realism of portraiture and of dress, or the grand and noble air which invests all that might, less skilfully treated, appear mean and paltry in detail, with an effective sculptural truth that appeals forcibly to the imagination.

As to the perfect mastery which he exercised over marble, there has never been but one opinion regarding Roubiliac. His executive power has never been surpassed. It is not easy to point to instances in which it has been even approached. The hand of Mrs. Nightingale, in which life seems to be just ebbing from the veins; the anxious, terror-stricken glance of her husband; the pleading, persuasive rhetoric that breathes alike from the attitude and the expression of the Argyle Eloquence; the anatomy of the skeleton (which is at least as poetical as the "Death" of Euripides), gliding from the tomb; the plucked feathers and worn stumps of the wings of Time, when his course is run; are each as faithful renderings of nature as are the wrinkles in Shakspeare's stockings, or the careless creases in his doublet. In fact, the exquisite finish which the chisel of Roubiliac gave to dress, and hair, and all the accessories of his figures, is such that it would withdraw the attention from the higher ideal characteristics of his compositions, had they been less signally stamped by the very highest impress of the genius of sculpture.

In his single figures,—the Locke, the Handel, the Shakspeare, — perhaps, above all, the Newton,—the power and taste of Roubiliac are most distinctly to be appreciated. The Handel in Poets' Corner was left partly unfinished at the sculptor's death. The score of Handel's own setting of the words, "I know that my Redeemer liveth," lies open before the great composer; who is represented as listening to that heavenly music of which he has left us no feeble or indistinct echo. For the Shakspeare, which was executed for Garrick (and left by his widow to the nation), that actor himself sat, or rather stood. The attitude was not chosen by Roubiliac, but by Garrick. Miserably lighted as that statue is, in a corner of the hall of the British Museum, the attention of the spectator is yet divided between the grandeur of the head and the felicity with which the attire is rendered, in a manner at once exact and pictorial. There is more labour of finish bestowed on a single limb of one of these figures than on the entire superficies of some of the statues that adorn our public places in honour of certain great men of our day. The Newton, in the ante-chapel of Trinity College, Cambridge, which Canova pronounced the finest statue in England, and one of the finest in the world, is also capriciously lighted. The position of the hands, holding a prism, is not that of the original design, but was a subsequent pose adopted in consequence of a flaw in the marble. Whatever was the cause of the change, the result is not such as to be regretted.

It is on the ground of this accuracy of detail and elaborate minuteness of textile finish in the marble works of Roubiliac, that it becomes so highly interesting to contemplate the productions of this artist under his hitherto disregarded character of a worker in terra-cotta. We intimated that there is ample evidence that he not only moulded his designs in clay,—a small sketch preceding a full-sized model,—but that he was in the habit of baking and preserving his models. We do not speak from mere surmise. The South Kensington Museum contains the terra-cotta sketches of his statues of Locke and of Shakspeare, the first 23 in., the second 17 in., in height. Mr. F. Roubiliac Conder, the great-grandson and representative of the sculptor, possesses, among other relics, the original sketch in terra-cotta of the monument of Sir Peter Warren, in the north transept of Westminster Abbey. The corresponding terra-cotta sketch of the Nightingale Monument is in the rood-loft of Westminster Abbey,—Death gone, and the head of Mr. Nightingale gone, but the fainting form of the lady fine and effective. In the National Portrait Gallery at South Kensington (which has recently purchased Carpantiers' beautiful portrait of the sculptor, engaged in modelling the very statuette of Shakspeare before referred to) is a bust of Hogarth, a little smaller than life. A life-size bust of Shakspeare continues the list, an admirable specimen of modelling, with the sharp lines struck by the modelling-tool fresh and distinct; the mouth and moustache wonderfully expressive and delicate. Mr. Murray bought the original clay model of the bust of Pope, now the property of Sir Robert Peel, at the sale of Samuel Rogers. In a contemporary crayon portrait of Roubiliac, in the possession of Mr. Conder, the sculptor holds a life-sized mask of Medusa, also in baked clay, on which he is at work. The existence of these eight examples of work in terra-cotta by a sculptor of whom comparatively so few works are extant or on record, is conclusive as to the habit of the artist. It is probable that more are yet to be collected.

The chief characteristics of these models, and more especially of the smaller ones, are the perfect freedom, *abandon*, and "go" which the sculptor has impressed on the clay. There is no elaboration of detail—no unmeaning prettiness of feature. On the contrary, the faces are sometimes anything but pleasing, although they never fail to be expressive. The face of the miniature Shakspeare is blunt—almost coarse. That of the little Locke is highly characteristic. That of the female figure in the Warren monument, which in the marble has a somewhat *retroussé* nose, gives the idea of the more delicate face of the statue, evidently a portrait, by a sort of rude forshadowing. The Shakspeare and the Hogarth are carefully but yet boldly modelled, both in features and in dress. In a word, the style proper to clay is as admirably illustrated by the *terra-cotta* works of Roubiliac, as is the style proper to marble by his finished works in that noble material.

Roubiliac threw his thoughts upon paper before he rough-hewed them in clay. The original sketch for the Argyle monument is now in possession of a distant connexion of the sculptor's family. It was inclosed in a box, with an attached memorandum to the effect that it was the design contemplated in the agreement between Louis François Roubiliac and her Grace the Duchess of Argyle. The design gives but small promise of the vigour and beauty of the work. In the early terra-cotta sketches, on the contrary, the fire of the sculptor's genius has caught and informed the rude material. These models are not anatomical studies, like some of the most valuable relics of Italian art, but true sculptural sketches, in which the form and disposition of the drapery have received as much attention as the drawing and attitudes of the figures. The folds of the gown of Locke were as present to the imagination of the sculptor as was the power and intelligence of his brow. The drooping fall of the flag, behind the bust of Sir Peter Warren, serves to combine the attendant figures into one group, harmonious with the bust, which the male figure is so gently placing on the tomb. As the appropriate garb of their day forms a part of the individuality of all duly authenticated ghosts, so in the works of Roubiliac are we presented with the subjects of his portraiture as they lived and moved; the men and women known to their friends, but seized and immortalised under their very happiest phases.

The use made by Roubiliac of terra-cotta is more especially worthy of note from the extreme fastidiousness of that artist as to material. The marble of his statues is always perfect. It is singular in its purity. The Gascon sculptor has been known to dash in pieces a partly-finished statue, because of the appearance of a flaw in the marble which he could not avoid, and would not patch. Unlike Nollekens, who has been detected in sawing off and replacing the head of a figure, Roubiliac was inexorable in his demands for spotless marble. Hence, in some degree, the limited number of his works; hence, he died poor; but hence, in no slight measure, his fame.

The most important lesson to be drawn from the comparison of the works of Roubiliac in terra-cotta, with the statues of the same sculptor in marble, is the illustration of the fact how much more appropriate style depends on the material than on the special taste of the artist. The sculptor who, of all others, was the most delicately fastidious in the choice of the finest marble, and the most scrupulously exact in giving a finish like that of Nature herself to his work in that precious substance, throws clay into form with all the careless energy of a master at play. For the student,—and what artist ever ceases to be a student?—the lesson is one of no little value. Let every artist select the medium by means of which he can best give form to the conceptions of his imagination. But let him remember that, the medium once selected, excellence can only be attained in the style proper to that medium. Art has her own laws, which none can disregard with impunity. The author of a bald, conventionalised, unfinished effigy in marble or in bronze will never attain the fame of a sculptor, any more than will the artist who should endeavour to manipulate clay until he teases it into the likeness of wax work. The sculptor in the round, the sculptor in *relievo*, the modeller in clay, the modeller in wax, the carver in wood, the carver in ivory, the founder in bronze, the worker in *repoussé*, the chaser, the gem-cutter in *cameo* or in *intaglio*,—each has a certain limit of style and of scale proper to the material in which he works. He may, it is true, excel in more than one, or even in many, of these several branches of art (as Cellini and Da Vinci did in their day), but he will never, by a confusion of style, lose the characteristic beauty of each. In whatever province of sculpture the student may feel most anxious, or most able, to excel, let him bear in mind that it is by the masterly treatment of clay that the sculptor will best lay the foundations of future eminence.

THE ART AND ENGINEERING JOURNAL OF THE MILANESE.*

THE professional Milanese journal bearing the title of *Il Politecnico* has now fulfilled its useful mission for eighteen years. After the manner of the workings of men in the nineteenth century, it carries on the reputation Milan maintained of old as a seat of art and constructional science. If we can no longer find at Milan Cathedral the schools of sculptors and artists we should have found busy there in the Mediæval centuries, we have this disseminating medium in good working order as part compensation. In the number before us we have word of great works, and read of earnest endeavours to set on foot still more important public enterprises. Marco Frisone da Campione and his Campionesi, Jacopino da Tradate, Amades, Solari, and the various artists attached to the Veneranda Fabbrica, have passed under the guidance of death into another world, and their places know them no more; but, instead, we have a college, or association, of engineers and architects numbering 175 members; and *Il Politecnico* shows us that many of them are good men and true, doing their measure of work for this generation,—which measure is all the better and fuller, doubtless, for the example and remembrance of the masters we have mentioned.

The journal before us opens with a minute account of the plan of a new provincial palace, for the transaction of the business of the Prefecture and other branches of the public service, in Bergamo. This is followed by a paper upon the possibilities of the cultivation of beetroot in Italy. Then a report by Dr. Luigi Gabba, made for the Minister of Public Instruction, is given, which relates to the researches in the laboratory of Messrs. Lawes & Gilbert, who, with the usual Continental obscurity in the matter of names of English persons and things, are located at *Rothamsted*, near London; a paper, by Professor Camello Grada, on a new mode of measurement, he calls *Nonio Fisso*; some observations relating to the amount of a due water supply; and the rest of the bulk of the journal is devoted to the proceedings of the College of Engineers and Architects we have mentioned. Beyond the business usually transacted at meetings of pro-

* Il Politecnico, Giornale dell' Ingegnere Architetto Civile ea Industriale. Anno xviii., Num. 1 e 2. Gennaio e Febbraio, 1870. Milano, Tipog. e Litog. Degli Ingegneri, via Lupetta.

fessional or amateur societies of the kind, the chief questions of interest before the members were details relating to the canals for the irrigation of Lombardy, conceded to the engineers, Sig. Villoresi & Meraviglia, which occupy a large space. A commission of five Milanese engineers was appointed to examine and consider the project, and the information brought before the college is the result of their deliberations.

The proceedings of the Italian Society of *Scienze Naturali* are briefly given for the year 1869, when the re-union was held at Catania, and numerously attended, including a letter, addressed to the Society, by the Alpine Club, detailing their botanical achievements. Shorter, still, is a report of the proceedings of *Geodesica Nazionale* Association, notwithstanding this also includes a letter from another society, a fifth association of *savans*, the *Societa Eidypsometrica*. All tell of work and progress. The journal itself is most creditably conducted.

SCIENCE IN ARCHITECTURE.*

AN architect's specification is a good illustration of what constitutes science in architecture. In this paper I purpose dealing with some of the points that the carrying out of a specification suggests.

FOUNDATIONS, DRAINS, AND BRICKWORK.

The best foundation, as a general rule, is growing sand, and the least number of settlements are usually observed to buildings upon this foundation. Rock, known to be solid, is equally good, but rock is often treacherous, such, for instance, as may be found about Litherland. Most of the houses in Litherland Park are upon rock, and they have given seriously. Faults in the rock, holes, loose strata, or soft stone underneath may give, and if the rock does give, from any cause, the building receives a shock resulting in the usual defects of serious settlements. Growing sand will not give in this way; it has often a tendency to expand rather than to sink, and if it gives it does so but little, and that evenly, and does not hurt the structure upon it.

For the same reasons that make rock doubtful as a foundation, clay is more so: there may be, though hidden, what is technically termed ravines or other holes in the clay; these cause the structure to slip. If a solid bed can be assured, the architect may determine upon building without fear, but this is often impracticable. A thin bed of clay with rock underneath is a very treacherous foundation; the clay is almost sure to move, and should therefore be excavated. Cracks in buildings do not always arise from settlements in the foundations or defective work. All buildings have a tendency to settle and contract as the materials with which they have been built become dry. Brickwork, for instance, must contract and settle to some extent, and stone put into a building fresh from the quarry is more or less wet, and will shrink in some degree while drying. This accounts for the open joints sometimes visible in new buildings; these cannot be altogether avoided; better that this appearance, which can easily be set right, should exist, than the stone be made so tight that it will snap when contraction begins, and the materials dry. We require cills and steps to be bedded hollow for this reason, to provide for the results of contraction.

DRAINAGE.

Drains, where there is not much fall, are best of brick or of unglazed tiles; the idea that glazing improves drain tiles for all purposes is not correct. It was at first thought that the invention would cause the soil to pass easily through, but, instead of that, experience proves that in flat drainage the soil clings to the glazing far more tenaciously than to the unglazed material. It may be accounted for in this way; the glazing keeps the sides of the drain pipes very dry; they are so impervious that water cannot be communicated from the outside; and the soil will cling to the dry article while it will fall from the wet one, or be easily removed by a slight flushing of the pipe. Unglazed pipes are generally wet when in use, because moisture from the outside earth soaks into them, and the moist surface thus presented to the soil keeps the whole in a favourable state for the removal of the soil when a slight flushing takes place. Brick drains are for the same reason much better than glazed stoneware. I have known 6-in. drain tiles taken up in the neighbourhood of Liverpool, after having been laid but a year or two, and soil 2 in. thick has been clinging to the sides all round, fast, like mortar, leaving but 2 in. for water and other drainage to flow through; such pipes must evidently soon become choked up. This instance occurred where the ground was flat. Brick or unglazed pipes should be used in such cases. Where there is a good fall glazed pipes may be used, as they are more durable. Within the last few years we have known drains laid about Liverpool of 18-in. glazed pipes where there has not been much fall, and where the drains have often run 18 ft. below the ground level; these, it seems to me, are liable soon to choke from the cause named, and then how are they to be cleaned? Flushing will not take the soil off; it clings so fast to the smooth surface that forcible pressure is necessary, and at such a depth it is not safe for men to go down 18-in. pipes. A good brick drain would cost very little more, and would answer better in every way. In such rocky ground as is to be found about Liverpool a cheaper drain than the glazed pipe might often be obtained by cutting an opening in the rock and covering it with flags, and this would answer every purpose.

If drains are laid in running sand, it is better to set them in cement, then cover the joints with clay, as the sand will otherwise find its way into the drains before the cement is dry and choke the pipes; by covering this cement with clay, the latter, which will not at once let the water soak through, becomes a covering to the cement long enough to let it harden, and though the clay will in time be washed away, it will then have done its work.

In ordinary foundations, as generally understood, clay only is the best bedding for drains; there is no fear of the earth or growing sand getting into the pipes, and the clay allows them to yield to a pressure which might break them if set in cement. Of course, the danger of the pipes breaking, in case of an uneven pressure, when they are set with cement in running sand, still remains; but this is the less evil of the two, and must be borne.

MORTAR.

Mortar is better old than quite new; it is a mistake to specify,—"only new mortar is to be used." It is with mortar as with clay for bricks, if clay is used for bricks after having been tempered but a short time, the result is apparent in inferior bricks; they are brittle, and will not stand fire or weather; but if the clay is allowed to lie a long time it consolidates, works together, bonds, and makes tougher and more durable bricks: so if mortar is used while fresh, it is brittle, technically—short, the particles do not bind; but if allowed to stand for some days, the particles work well into one another, the whole becomes tough and clammy,—a great essential. When we try mortar, as architects, we like to feel it tough and clammy; but we cannot obtain this so well if we require it fresh. The difference between modern and ancient usage may account for our modern mortar not being so good as that of the ancients. Our mortar is now, as a rule, used fresh; in olden times it was frequently buried for twelve months before using. Mortar, though not used fresh, should be protected, according to the weather, and be kept moist; it is injured if allowed to become so dry as to require remixing.

It seems to me a belief is current that mill-made mortar is necessarily better than hand-made. I cannot agree with this notion. We were told last meeting that in the building of concrete houses fine sand separates from the cement, does not bind, and that coarser material is better. We all know this to be the case with cement work, hence we specify gravel; for the same reason, sand in mortar will not bind so well with the lime if ground fine in a mill, but is better for being coarse, while the bonding of the separate ingredients accomplished by the mill is, in hand-made mortar, better secured by capillary attraction when allowed to lie unused for a few days. The ancients, or Mediæval builders, it is evident, did not use any mortar to correspond with our mill-made; if old buildings are examined, it will be found large particles of the ingredients still exist in the mortar, showing material very much like gravel has been mixed with the lime. Another reason why mill-made mortar does not in practice prove so good as hand-made is, the men at the pug-mill will, however they are cautioned, throw in soft broken bricks and other refuse to grind up with the sand; and this refuse will not adhere so well to the lime as sharp sand or gravel. If men merely screen the sand for mortar, they cannot adopt this practice. Mortar for pointing is now sometimes buried from force of circumstances. If too much is made the builder buries it, and never finds it worse for such treatment. Mortar for pointing should not have much burnt marble in it, as the burning of the marble destroys its nature. Ground refuse from glass-works is now very frequently used for pointing, and with great success.

SMOKY CHIMNEYS.

It would be out of place here to attempt to deal with this evil in detail. I will simply allude to one principle only, apart from defective building, and the numerous inventions as remedies. It will invariably be found that chimneys have a tendency to smoke when at the side of a house where no building the same height adjoins. The space at the side of the house being sheltered forms a vacuum, and as wind passes over the building, it has a tendency to fall down and fill up this vacuum, and in so doing it rushes down the chimneys at that end of the house. This explains why such chimneys smoke during particular winds only. They do not smoke when the wind blows directly against them, but when it comes from an opposite quarter passing over the roof of the house. This, of course, suggests the necessity of making special preparations for all chimneys in such positions. A good curve to the flue will often prove sufficient. Chimneys smoke worse in Gothic houses, because the vacuums created are more numerous. In flat-roofed houses, if the chimneys are in the middle of the roof there is not much fear of their smoking.

MASONRY.

The frequent failures in the use of Bath stone in and near Liverpool,—the utter want, as it has appeared to me, of its adaptability to our clime,—have often attracted my attention, and I have tried to find out the reason why a stone of such pleasing appearance, and so useful in working, could not be more generally used by us. When in Bath, a short time ago, I had an opportunity of paying attention to the subject. I soon came to the conclusion that the cause of failures in the use of this stone in Liverpool exists mainly in applying to the wrong quarries for stone for outside purposes.

If we require a good stone for outside purposes, we should specify "Box Ground," or the "Combe Down" stone. These are the most durable; they work freely, and the former is considered equal to Portland stone in durability, while much cheaper. The Combe Down stone was used in the building of Bath Abbey; nearly 300 years have elapsed since this abbey was restored, and yet many of the mouldings are still perfect. The Combe Down stone is not equal, on the whole, to the Box Ground; for outside purposes it requires to be selected, but when selected, gives great satisfaction; the blocks are not so large as those of the Box Ground; its texture is hard and coarse.

The Box Ground is coarser and harder than any of the Bath stones, and while most sorts will go to pieces in frosty weather, this will stand the hardest frost. It may be safely used for any external work, plinths, copings, or weatherings. Laying Bath stone on its proper bed has a great deal to do with its lasting well. This may always be determined by the thin black veins which run up the bed; they never run in the bed; and in some of the stone there are hard black veins termed lists or ribs; these always run in the bed and never across. The Box Ground stone can be obtained in lengths of 12 ft. 6 in., or 14 ft. 6 in.; the blocks vary in size from 4 ft. to 120 ft. cube.

The Corsham Down stone is the best to specify for inside purposes. It has a beautiful warm colour, and looks more effective than any other; while the other stones alluded to are very coarse, this is, on the contrary, of very fine texture, but durable and strong. It is free and easy to work, as, indeed, are all the Bath stones. It absorbs a great deal of water, and so in hard frost requires to be covered up, as it would burst if left exposed. It is the most regular in quality of all, and considered the best of our English stones for internal work. Patches of dark blue or slate-colour are sometimes found. These portions work in with the rest for ornamental effects in chimney-pieces, &c. The stone is sounder where these patches exist.

Another sort is the Farleigh Down stone, the principal feature of which is, that the quarry contains two beds, the red bed and the white

* By Mr. Wm. Parslow. Read at meeting of the Liverpool Architectural Society. Some of the opinions expressed are open to discussion.

bed. This stone does not stand the weather well. It is more easily worked than any of the others; but the appearance is not so pleasing as the Corsham; it dries out often in red patches, giving an appearance termed foxy. It is in great demand in the neighbourhood where quarried, because of its price and easy working, but has no advantages to offer for Liverpool.

MARBLE.

With reference to this material for lavatories, wall-linings, chimney-pieces, &c., it is surprising at first to observe the difference in prices of articles from different works. Chimney-pieces, &c., sent over here direct from Belgium are, as a rule, much cheaper than those that can be bought from marble works of any standing in England; but the difference, as it appears to me, arises mainly from the less amount of labour bestowed upon the polishing. I have frequently known cases where chimney-pieces brought direct from Belgium have had to be polished again within two years, and the expense of this second polishing necessarily makes the article in the end very costly. Although I do not know the exact method of polishing adopted by the Belgians, it seems evident that they depend more upon a quick dry polish and chemical processes than the slow-laboured style of our English marble masons. The English plan is to grind and form the surface of the marble by means of wet friction, which is much slower than dry, and does not injure the marble, while dry rubbing does, by making it softer. This process is repeated with three or four different stones in order, and then the surface is glossed with lead and felt. This genuine English plan is superseded in some marble works, and doubtless in Belgium, by dry rubbing, a quick process, but one destroying the hard surface of the stone. The glossing operation is then performed, not by rubbing with lead and felt, but by pouring on the marble some such chemical as spirit of salt. This is so strong, that when passed upon the marble it produces a hissing sound, and must necessarily soften the surface. It then receives a slight rubbing, which soon occasions a polish; but this may be detected from the genuine English polish by a peculiar deadness. In course of a few years this polish disappears, and requires reviving. The true polish lasts for a generation, with ordinary care.

This chemical wash, but without the dry rubbing, is the English mode for polishing carved work; the ordinary rubbing would destroy the spirit of carved marble-work: it is therefore simply tooled, or, at other times, sanded, and then washed with spirit of salt: the consequence is, all English carved marble-work has rather a dead look, but this is not objectionable. It soils in the course of a year or two, but may be restored by a washing of American potash or chloride of lime. The Italian marbles, as they are called, most generally used in England, are the black and gold, the dove, Bardilla (which is like black and gold, but inferior); also the statuary, the vein, and the Sicilian. Lately the Irish marbles have been freely used in England. There are four sorts, red, green, black, and the fossil, a dark colour. Of the Belgian marbles, the St. Anne's must be classed among the best. The Belgian black is a very inferior article, and not equal to our common Derby black. All marbles are more or less rotten, that is, they are composed of so many parts that they have a tendency to come to pieces. The more beautifully they are marked, the more rotten they are. The various marks show the junctures or formations in the marble that produce this quality. For this reason, marble, if intended to be worked as a pillar, and to bear a weight, must be carefully erected; if out of the perpendicular, and supporting much weight, it is liable to snap at some of these formations. The black and gold marble, though one of the most beautiful, is one of the most rotten, and when polished is exceedingly susceptible to scratches and snips. The Italian dove and the Belgian St. Anne's are the most durable dark marbles. The Italian statuary, though a very beautiful marble, is soft. The vein and Sicilian are more durable, and will consequently resist dust better. The Irish marbles are equal to the Italian in quality; they are rather less expensive, on account of the cheapness of Irish labour.

Inferior marbles may be told by blotches and other faults, and by being soft they will not bear a fine angle. In less than a month after working inferior light-coloured marble-work will look black at the corners, which blackness cannot be wiped off. In good hard marble-work any such soiling will wipe off. Dark-coloured marbles are very rarely soft.

TIMBER.

With reference to the timbers used in this neighbourhood, spruce from St. John's or Quebec is good bearing timber, but when it does give it breaks clean; it snaps off very short. The fibre of the wood is short. Spruce curves and twists very much, and often the cracks we see in plaster ceilings are to be attributed to the twisting of the joists and spars, and are not the plasterer's fault. On the Eastern coast, Baltic timber has hitherto been used for the purposes for which we use spruce, and now, on account of increased facilities for importing Baltic timber, it is becoming more generally used in Liverpool. Baltic red pine is one of our best bearing timbers, and stands the weather well when used for outside purposes; its fibre is long, and it will bend rather than break quickly. Pitch pine, besides being most useful for finishings, is good for outside purposes, and stands the weather well, but occasionally the hot sun will bring out the resin, which runs down the wood, taking the paint with it: this makes it less desirable, on the whole, for outside purposes than red pine. Baltic white is a very nice wood, and looks well in floors; it is not so good for bearing purposes as the red; the knots in the white are often what are called pin knots, small and black; they dry and drop out. The knots in the red are larger, but sound. Baltic timber is often disfigured by a redundancy of knots: these do not militate against the wood, and often would not appear if the logs were cut up with judgment. A skilful workman can so cut through the knots that they do not show, simply by studying the way they run, and cutting through the feather of them.

Quebec is a superior yellow pine to that from St. John's; in the rough it is clearer, and when cut up is finer looking. If a piece of St. John's yellow pine be rubbed it will occasion a very fleecy surface; that from Quebec has less of this quality, and is often free from it altogether. Good St. John's and Quebec, however, cannot be distinguished by any but experienced judges.

The best Spanish mahogany to specify is that obtained from the city of St. Domingo; this is the most beautifully marked. That from the country of St. Domingo is an inferior sort. The bastard mahogany and the bay-wood are also inferior sorts. The bay-wood, of which we make such use, comes from the Mexican coast.

In French-polishing mahogany, polishers, if not well watched, will often lay a ground of red lead, whiting and plaster of Paris, then polish on top of this: this makes the work easy, which is otherwise very laborious. It, however, hides a great deal of the ornamental figure, and the polish quickly disappears. If ever this process is detected, the best plan is to have the whole taken off with American potash, and start afresh. Fine polishing is accomplished only by means of laborious rubbing with the different French gums in their proper order, and gradually the whole figuring on the wood becomes developed.

A peculiarity of the poplar wood, that makes it suitable for special purposes, is, that it will not burn; it only smoulders.

In practical joiners' work a great difficulty with men is to get them to bore their work before nailing. I refer principally to framing, and fixing mouldings. It is a little more trouble to bore first, and if men are not constantly reminded, they will neglect this in good joiners' work as well as in common. If there is no bore made first, there is a great tendency for the nail to slip off the stile into the panel, and the result is, if the panel shrinks at all, it takes the moulding with it and leaves a slovenly finish.

Extra attention is becoming necessary to these particulars, for, according to appearances, it is probable the principal work for joiners will eventually be fitting, since all work may in course of time be made by machinery.

At present English machine-work is not of that finish that will admit of its being used universally, but most of the foreign work has a very fine finish, and there is no doubt English machinists will before long be able to equal if not surpass this, and then I cannot see what objection there will be to machine-work generally. At the present time the cost of machine-work is not reduced to what it might be: so much of the tree has to be cut up before a proper grain for machine-work is obtained that considerable waste results. When this difficulty is better understood, and the portions of the timber that cannot be adapted to machine-work more successfully utilised, then the cost will necessarily be reduced. The portions of the tree where the branches unite causing a cross grain interfere now with the successful working of the machines and occasion the waste.

Of those portions of joiners' work that cannot at any time be made cheaper by machinery, the rebated sashes are a good illustration. Although these are frequently made by the machine, the result is not satisfactory; being run in long lengths, they do not cut well for mortising, and there must be a considerable amount of piecing before they are completed: this makes them almost as costly as home-made work, and not so satisfactory.

IRONWORK.

Architects often specify the cold-blast iron, and do not get it. The same with the Low Moor iron.

The Low Moor iron from this country is the best wrought iron we can get; it is an extremely expensive material, being very hard to work; the expense per ton wrought is double the expense of iron wrought from Sheffield, Warrington, the Clyde, or any of the ordinary black countries. I do not think it wise to specify Low Moor in the ordinary way: instead of 24*l.* per ton we may be charged 50*l.*, and, after all, not get what we pay for. For most purposes ordinary iron will answer equally with Low Moor, if a little thicker material is used; but where small size is required, and great wearing power, of course Low Moor is best. In bolts, for instance, they do not wear much; if 1 in. of Low Moor iron will be strong enough, then make them of ordinary iron 1¼ in. thick. By specifying these you save the extra charge, besides avoiding the risk of having 1-in. bolts of ordinary iron put into the work, which might prove too weak. Low Moor iron is more malleable and tougher than the other; it has long fibres; the difficulty in severing it is the best means of testing it; its parts have to be literally dragged asunder. Cold-blast iron from the various depôts in Wales is the best class of cast iron; and as it is difficult to drag the Low Moor into pieces, so is it difficult to break this. I have myself broken ordinary pig with one blow from the hammer; but cold-blast iron will sometimes bear twenty blows from a smith without breaking. The difference between cold blast and ordinary cast iron is more easily seen than that between Low Moor and ordinary wrought iron. When cold blast is placed beside common iron it has a bright look, while the common has a dull, dead appearance. But as a rule it takes experienced men to detect these metals from the common iron: it is, therefore, well when they are required for special purposes to specify an amount for them, and take special means to get the work done.

IRONMONGERY.

The numerous qualities of ironmongery fittings necessitate the most careful attention on the part of the architect. As a rule, good class ironmongery may be told by its finish; if the finish of an article is workmanlike and satisfactory, it may generally be concluded that the hidden portion is good; but if there is a rough and uneven finish, a tendency to snip and get out of order, then it is well for the architect to pay attention to the hidden work, as the article is not likely to be first-class. Common sash-fasteners, having an effective appearance, often surprise the houseowner by breaking off when more than ordinary pressure is applied; an examination will usually show these to be of hollow metal instead of solid. If we specify solid articles, and see that we get them, we may be generally assured that the rest of the work is good. In order to secure good locks, bell-pulls, or door furniture, the best plan is to allow a price and arrange specially for the purchase of these articles. Handles coming off is a constant source of annoyance to houseowners, and they take for granted when this occurs the furniture must be jerry, whereas the best furniture is liable to this difficulty, and unless Pitt's or Walker's patents are used, I do not see how, with present appliances, the evil can be altogether avoided.

Bell-hanging is often a source of trouble to the architect. No. 16 copper wire is a good strength, but difference of opinion exists on this point. Fault is sometimes found with the putting two or three wires in one tube; this need be no drawback; the difficulty is when the tubes in which the wires are put are too small; a ¾ in.

tube, or even a ¼ in. tube, will admit of three or four wires working satisfactorily. The cause of bells ceasing to ring properly a few months after the building of a house is often very excusable, though the circumstance in some minds stamps the work as bad. The bells having been put in while the materials of the house are in a green state, they are liable to rust, and in some localities more than in others. The iron portion of the crank rusts and loosens the wires. These, therefore, require a little attention when this occurs, which good bell-hangers are willing to give; indeed, it is well to require bell-hangers always to keep their work in order for six months.

GASFITTING.

A fruitful source of jumping in gas, when there are not the usual irregularities of defective workmanship, is the following:—¼ in. piping is fixed instead of ½ in. or wider: the consequence is, when the gas passes through the pipe of the kitchen or other warm apartments it becomes rarified; it then ascends to the colder apartments, and, through having been heated, is condensed into water; it then by its own weight falls down the pipe. If the pipe were wide enough, say ½ in. or ¾ in., then the volume of water thus formed would, because of its own weight, have sufficient power to pass through the pipe to the proper syphon or meter, where it could be let off at will; but the pipe being only ¼ in., the volume of water thus formed has not sufficient weight to make its own way down the pipe, and the force of the gas coming up is sufficiently strong to show a balance of power, the gas pressing upwards and the water downwards proving in turn the stronger.

On account of this tendency in gas to become rarified in warm apartments, and the more easily condensed into water afterwards, a meter ought never to be placed in a kitchen or other such like place; the colder the apartment the better; the pipe ought never to be less than ½ in. for the reason named, and even this size without a good fall is liable to occasion jumping. All gas is liable to form into water, and as it passes through cold regions it invariably does so to some extent. For this reason large syphons are provided in the streets, and a great deal of water may be seen taken from them at times, being merely condensed gas. All gas is liable to freeze; on being made it passes through water; hence it is damp to begin with. Frozen gas need offer no serious difficulty, if the pipes are large enough, and have a good fall to a syphon. By the application of warmth it will melt into water, and then pass away.

LONDON CLUBS.

THE Cocked Hat Club, an institution founded as an adjunct to the Society of Antiquaries, and whose children only, as with the Society of Noviomagus, are qualified to become members, had their annual outing on Saturday last. The members present included Sir William Tite, M.P.; Mr. F. Ouvry, F.S.A.; Dr. Doran, F.S.A.; Mr. Henry Hill, F.S.A.; Mr. William Smith, F.S.A.; Mr. Durrant Cooper, F.S.A.; Mr. Crowdy, F.S.A.; Mr. A. White, F.S.A.; Dr. Diamond, F.S.A.; Mr. Talbot Bury, F.S.A.; Mr. W. J. Thoms, F.S.A.; and some others. They descended at Three Bridges Station, on the Brighton line, that they might see the Saxon Church at Worth, and were unanimous in the expression of their regret, to use a mild term, that old work had been so ruthlessly removed. The chancel has been rebuilt, and the curious old wooden steeple, formed with four large tree-trunks, cleared away. Some particularly interesting windows of rude character have been opened in the north and south wall of the nave, forming a clearstory; and the north and south doorways are seen to have been very lofty and narrow with semicircular heads. The windows are each of two lights, round-arched, separated by a stout rough shaft. They then visited the pretty village of West Hoathly (it should be *ley*, but the people of the locality stick to the "ly"), and the ancient parish church, passing on their way Selsfield Common, one of the loftiest spots in the neighbourhood, commanding charming views, and where anciently the beacon flamed in reply to others at Ditchling and Chanctonbury. A fine old stone house in the village, belonging to the end of the fifteenth century, is connected by popular tradition, if in no other way, with Anne of Cleves. The church, now in the hands of the restorer, and roofless, shows, in the north wall of the chancel outside, remnants of Norman work, and elsewhere of Early English. Two cast-iron gravestones (to use an Irishism) in front of the west door of the tower served to remind the club of the ancient iron-works of the county, which flourished till the middle of the last century, and led to large clearances of timber. It was remembered that the ponderous iron railing around St. Paul's was cast in Sussex (at Lamberhurst), and cost over 11,000*l.*; and all had seen some of the many chimney-backs and dogs still remaining in the neighbourhood. It was time now, however, for the real object of the day,—a visit to Rockhurst, the residence of Mr. Charles Hill, F.S.A., and its famous rocks and woods. Here they were joined by Mr. George Smith, of Paddockhurst, Dr. Jonson, and some others, and, being first photographed as a group in conjunction with the house, made their way to the remarkable range of sandstone rocks, of which the poised mass called "Great upon Little" in Andreds Wood is the most widely known. Of this Mr. Charles Hill gave a short account. Weighing some 300 and more tons, it rests on what looks in some positions a point, but is in truth a narrow ridge some few feet in length. The faces of the rock are covered with initials and dates, ranging, so far as discoverable, from about the year 1600: one century seems to have been scraped out by the next. Old men mention as amongst those visible not long ago, the initials of Pitt and Fox, the latter of whom, it will be remembered, lived at St. Ann's-hill, near Chertsey, in the adjoining county. The stone has been viewed as the emblem of the British deity Andrast, but on what ground we do not know. Suffice it for us to regard it as a remarkable product of nature, and to hope that it may be long before those influences which have brought about its present form and position may so much farther operate as to cause it to topple over into the valley at its foot, where already lie other huge masses detached from the range above. Sir William Tite, who is strong in geology, had—

"——Ample room and verge enough"

to discourse of early seas, earthquakes, upheaved strata, and channels scooped by rushing water, and used his vantage well. Afterwards the whole party were hospitably and most elegantly entertained at Rockhurst, and quite late in the evening came back rejoicing.

THE BUILDINGS FOR ANNUAL INTERNATIONAL EXHIBITIONS.

THE buildings in which the Exhibition of 1871 will be held have been designed by Lieut.-col. Scott, R.E., and are to be of a permanent character. Those persons familiar with the Horticultural Gardens know the long ornamental arcades parallel with the Albert and Exhibition roads. At the back of these arcades is a piece of waste ground, some 200 ft. wide, extending to the road. On these strips of land the two main exhibition buildings are to be built. At their northern ends, these main buildings will be placed in communication with the conservatory of the Horticultural Gardens, and through it with the new Albert Hall of Arts (the grand promenade of which will be utilized for exhibition purposes, the educational collection being placed therein) by covered approaches, which are being made upon the top of the arcades connecting them with the conservatory. The southern ends of the main buildings will communicate with the permanent portion of the Exhibition building of 1862, which forms the southern boundary of the Horticultural Gardens. This building is now used for the exhibition of objects in connexion with the South Kensington Museum. By this means, the building will completely surround the gardens, to which the public will be admitted at certain times, and under special conditions, which have yet to be decided upon. It is also proposed to connect this series of buildings with the South Kensington Museum, by means of a covered way under the Exhibition-road, and also in the same manner with the Metropolitan railway.

The length of the main buildings, on the ground floor at each side, will be 1,100 ft., on the upper floor at each side, 600 ft. Their width throughout will be 30 ft., and the height of the two floors, 60 ft. The level of such a length of building will be broken each side by four raised pavilions or dwarf towers; four of these, on either side of the north and south extremities, will be 35 ft. wide, the two centre ones being 65 ft.

The ground-floors of the buildings consist of a series of chambers, broken in equal lengths by the varying dimensions of the central portions, the light for which is obtained from large windows in the east and west sides of the respective buildings, but there can, of course, be no windows in the sides which adjoin and continue the present arcade walls.

The lower story will be set aside for the exhibition of woollen fabrics, manufactures, tools, and machinery. The upper floor will be a repetition, on a smaller scale, of the picture-gallery of the Exhibition of 1862; the galleries will have no side windows, but will be lighted with a single centre ridge glass roof. The floor will be fireproof, made on the Fox & Barret principle, of rolled iron girders filled in between with 10 in. of concrete, and tiled on the upper surface. Provision is made in the built girders for heating the buildings by means of hot-water pipes, and also for ventilation. These galleries, which are to be 30 ft. wide by 25 ft. high, will be used exclusively for the exhibition of works of art and art-manufactures, such as painting, bronzes, sculpture porcelain, decorative furniture, jewelry; in fact, every kind of artistic work, whether applied to objects of ornament or domestic use.

On the side of the Albert and Exhibition roads, the buildings will not be excessively decorated. In the front, overlooking the Horticultural Gardens, a greater endeavour in that respect will be made. The arcades of the Horticultural Gardens, which are only 12 ft. wide, are being finished, and their stone capitals and cornices are being carved from designs by the South Kensington art-students. The arcades, which are at present only temporarily covered, are being roofed over in a permanent manner, and will form a promenade on a level with the floor of the picture and art galleries of the upper saloons, with which they will communicate through wide doorway entrances. The side next the gardens will have a terra-cotta balustrade, from which rise light ornamental carved wood columns, supporting a trellis-work of iron running along the whole length and breadth of the walk. This trellis-work will be interwoven with vines and creepers. The balustrade will contain vases filled with flowers, and a view will be obtained over the whole extent of the gardens beneath.

The buildings are in the Decorated Italian style, with mouldings, cornices, and courses in buff-coloured terra-cotta; the brickwork being of the red Fareham bricks, so as to match the garden architecture, and harmonise with the new museum buildings which are rising in front of them. The buildings altogether will accommodate, it is stated, 50,000 people.

POSITION OF CATHEDRAL ORGANS.

THE proper settlement of this question is of so much importance that it is desirable all sides should be heard. We give place, therefore, to the following:—

Sir,—It appears from a published report on the restoration of the interior of Salisbury Cathedral, that Mr. G. G. Scott is advocating the dispersion of cathedral organs into various parts of the building, as one way of getting out of the difficulty of providing for musical, without interfering with architectural, effect. Mr. Scott admits, what in a recent article on the subject of church organs you strongly laid down, that the position on the choir screen is the best possible for the organ acoustically, as affording it free space to speak all round, without having its sounds in any direction driven disproportionately upon the ear by reflection from an adjoining wall. In opposition to the upholders of what he calls the "vista" theory, Mr. Scott is favourable to the choir-screen position for an organ of moderate size (in short, I suppose, for the old-fashioned English cathedral organ), but deprecates the great size to which the instrument has of late attained, "the inordinate growth of modern organs,"—a phrase which could only have been correct with regard to English organs, as there have been in German churches for nearly two centuries organs larger than any erected in our cathedrals, except the York organ before it was cut down. In view, however, of this deprecated "growth," he would leave only the small portions of the instrument (the choir organ?) on the screen, and "draft off all the cumbersome parts to the back of the stalls in the first arches (right and left) in the choir aisles, where they would be very much concealed; or possibly, if found practicable, into the triforium." He would leave the organist in his

accustomed seat in the "loft," but would introduce the electric movement, "which would obviate all inconvenience arising from the division of the organ into three sections."

Now, with regard to the musical effect of an organ, the scheme is not promising. It is of the greatest importance that the pipes composing an organ should be so massed together (without being crowded) that their sound should reach the ear simultaneously, and blend together as one instrument. They cannot do this if the pipes are distributed about in the manner proposed; and, moreover, the parts of the organ which it is proposed to place in the confined situations mentioned are just those which ought most of all to have plenty of space round them; if, as I understand, the major part of the "great organ" is to go off the choir screen, as well as the pedal pipes. With regard to those latter, the pedal diapason pipes may be placed on the floor with advantage in one respect, as these are not noisy, but only sonorous, and gain in resonance by being near the floor, though their effect sounding on each side of the listener alternately would not be good. But nearly every large organ now includes (and every one ought to include) in its pedal organ one or more powerful stops of the "reed" class, which are among the largest pipes in the instrument, and which, from their loud and harsh *timbre*, especially need to be placed away from very close contiguity to listeners, and to be as unconfined as possible with regard to sounding space. So much is this the case, that I have known a distinguished professional organist refuse to sanction the introduction of a pedal *trombone* stop into an organ which he was superintending, and which was to be erected in one of the now usual "organ-chambers," on the ground that "there was no space for it to sound, and it would only be a nuisance." If the people of Salisbury are content to have their instrument so dismembered it is of course more their business than mine; but they should think twice before they assent: and at all events this mode of treatment ought not to be made a precedent in dealing with cathedral organs. I understand that it has been already suggested for another cathedral which is being restored under the same direction. The system proposed would have all the drawbacks, which you have before commented upon, of the confined organ-chamber, together with the additional defect of widely separating portions of the instrument which have to be heard together, and ought to have a homogeneous effect. My attention has been called to the recommendations in the report on Salisbury Cathedral, by a cathedral organist of long experience, who completely and unreservedly deprecated such a scheme; and Mr. Scott may be assured that on this head he will have the musicians against him to a man, or, at all events, to AN ORGANIST.

[Our correspondent knows something of the matter on which he writes, and we allow him to be heard, but we by no means desire to pronounce at once against the architect's proposition: the success or otherwise would depend entirely on the way in which it was carried out. We know a church where the organ has been divided and placed on each side of the choir (in the first archway north and south at the west end of it), the communication being effected through a tunnel under the pavement of the chancel, and the result, so far as sound is concerned, is satisfactory in the extreme. It has the effect, however, of blocking up the chancel arches and, partially, the aisles, and certainly does not commend itself in that respect.—ED.]

PROPOSED ADDITIONS AT THE PARLIAMENT HOUSES.

SINCE we called the attention of our readers to the proposed alterations and additions for new refreshment-rooms, the Select Committee of the House of Lords has reported upon them. We subjoin a copy of their report, which notices several of the points to which we referred. The remarks of their lordships on the manner in which the work should be carried out, and on the risk of disfiguring the building, for want of a proper design, will commend themselves to all; and we cannot too strongly urge their importance on the Government and the public. The report is limited to that part of the proposal which affects the accommodation of the House of Lords:—

"That the committee have again met, and have been again attended by the Clerk of the Parliaments.

The committee have considered the report of the committee of the House of Commons, of the 20th May last, referred to them by order of the House, in which that Committee states, that they have considered the last report of this committee, and inform the House that this committee had advised their lordships to give up the Painted Chamber to the exclusive use of the Commons, in the event of the plans recommended by this Committee being agreed to.

It will be recollected that the House of Lords had, through this committee, expressed their readiness to give up their best committee-room, to meet the convenience of the Commons. In the report of the Commons committee it is stated 'that they abstain from entering into any inquiry respecting the arrangements of the House of Lords, as they consider such arrangements should be made by their lordships directly with Her Majesty's Government.' The committee therefore consider it necessary to recommend that steps should be taken by the House to secure an assurance from Her Majesty's Government that the conditions on which they have advised that the Painted Chamber should be given up to the Commons shall be fulfilled, as without such assurance they cannot advise that the concession in relation to that apartment, which has always belonged exclusively to the House of Lords, shall be made.

The committee hope that a competent architect may be employed to prepare the plans for the new room proposed to be given in exchange for the Painted Chamber, and for the approach to it from the landing-place on the staircase in the lower hall. As some alteration must be made in the window there, care should be taken that it is done in a manner consistent with architectural effect. They are confident that the House would be unwilling that, for want of a proper design, the building should be in any way disfigured, in carrying out their proposals.

Having examined the plans appended to the report of the Commons committee, they find that the kitchen therein designed will be only 14 ft. 9 in. wide, and, as they are informed, only 12 ft. 8 in. high. In the plans prepared by Mr. Barry, the kitchen was to have been placed under the new room to be erected for the House of Lords. By this, or some similar plan, very superior accommodation in space and height would be obtained, together with a more convenient situation for the joint service of the two Houses from the same establishment, should such an arrangement at any time prove desirable.

The committee have been informed that the difference in the estimate for this portion of the work between Mr. Barry's plan and that of the First Commissioner is not large; and the committee desire to repeat the remark made by them in their former report, that while 'they are very sensible of the importance of observing reasonable economy in all public expenditure, they feel that in making any permanent provision for the accommodation of the Houses of Parliament it is desirable that all should be done in the best manner, and that some additional outlay, by which greater convenience will be obtained, will be money well laid out.'

The plans laid before this committee by Mr. Barry last year, so far as they relate to the kitchen department and the new room, are appended to this report."

THE DONCASTER NEW CORN EXCHANGE AND MARKET IMPROVEMENTS.

A SHORT time ago the Corporation of Doncaster caused to be completed a new cattle-market and public slaughter-houses, which will compare favourably with those in any town in Yorkshire. The cattle-market is laid out with taste, while the slaughter-houses and the conveniences connected therewith leave little to be desired. These provisions are about to be followed by the erection of a new corn exchange and an additional wing to the present market-hall, to be used as a vegetable-market. The contracts for this work have just been opened. The work is divided into two parts. The first contract, A, includes the erection of a corn exchange, 91 ft. by 87 ft., and a vegetable-market, 64 ft. by 64 ft., having frontages of 300 ft. by 40 ft. in height. The buildings, so far as the stone-work is concerned, are to be of ashlar. The tenders for the mason's and other works were found to be of a very formidable character, no fewer than twenty-seven of the leading firms competing for the work. The amounts varied very much, the difference between the highest and lowest tender being considerably over 5,000*l*. The highest was sent by Messrs. Simpson & Malone, of Hull, the amount being 16,927*l*., and the lowest by Messrs. Weatherley & Rymer, of York, viz., 11,005*l*. Not fewer than five Bradford firms were amongst the competitors. The market committee, who had the management of the tenders, accepted that sent in by Mr. J. Athron, of Doncaster, the amount being 11,172*l*. The tenders relating to Contract B were also opened at the same time. The contract consisted of the roof of the Corn Exchange, including eight semicircular lattice-ribs, 60 ft. in diameter, and the T iron ordinary king-trusses for the vegetable-market roof, cast-iron columns, girders, and other works therewith. As in the first contract, the tenders were very numerous, not fewer than twenty-five of the leading Yorkshire and London firms competing for the order. Amongst the competitors were Messrs. Westwood & Bailey, London Engineering Company, Isle of Dogs, whose tender amounted to 3,200*l*. 3s., being the highest sent in. Messrs. Kirk & Parry, Westminster, sent in the tender No. 7 in amount on the list. The committee, as in the other case, accepted the lowest tender but one, which, in this instance, was sent in by Messrs. R. & J. Rankin, of Liverpool, the amount being 2,096*l*. The total amount of the two highest tenders was 20,187*l*. 3s., whilst the two lowest amounted to 12,955*l*. The total amount of the two tenders accepted was 13,268*l*.

SCHOOLS OF ART.

A School for Winchester.—A meeting of a highly-influential character has been held, Mr. J. Bonham Carter in the chair, for the purpose of considering the propriety of establishing a School of Art for Winchester. Mr. Buckmaster, of the Science and Art Department, explained what the department did to foster a love for art. It did not seek to make painters or sculptors, but to raise the standard of taste. The Mayor, Mr. R. Underwood, moved a resolution, which insisted on the desirability of establishing a School of Art, and read a list of names, commencing with Lord Carnarvon, Lord Eversley, Lord Northbrook, the county and city members, and other highly influential men, who had promised their patronage.—The Archdeacon of Winchester seconded the resolution, which was agreed to unanimously. The appointment of a committee was also voted, and subscriptions were invited, to provide a proper building (which Mr. Buckmaster said the department would assist to the extent of 2s. 6d. per cubic yard).

The Cambridge School. — On Thursday, the 23rd ult., the students went to Angelsea Abbey, for a sketching excursion. The party (of nearly forty) left Cambridge at a little after 10 a.m., and on arrival soon settled down in different parts of the grounds to sketch the interesting old house. Several very fair sketches, in colour as well as pencil, were made.

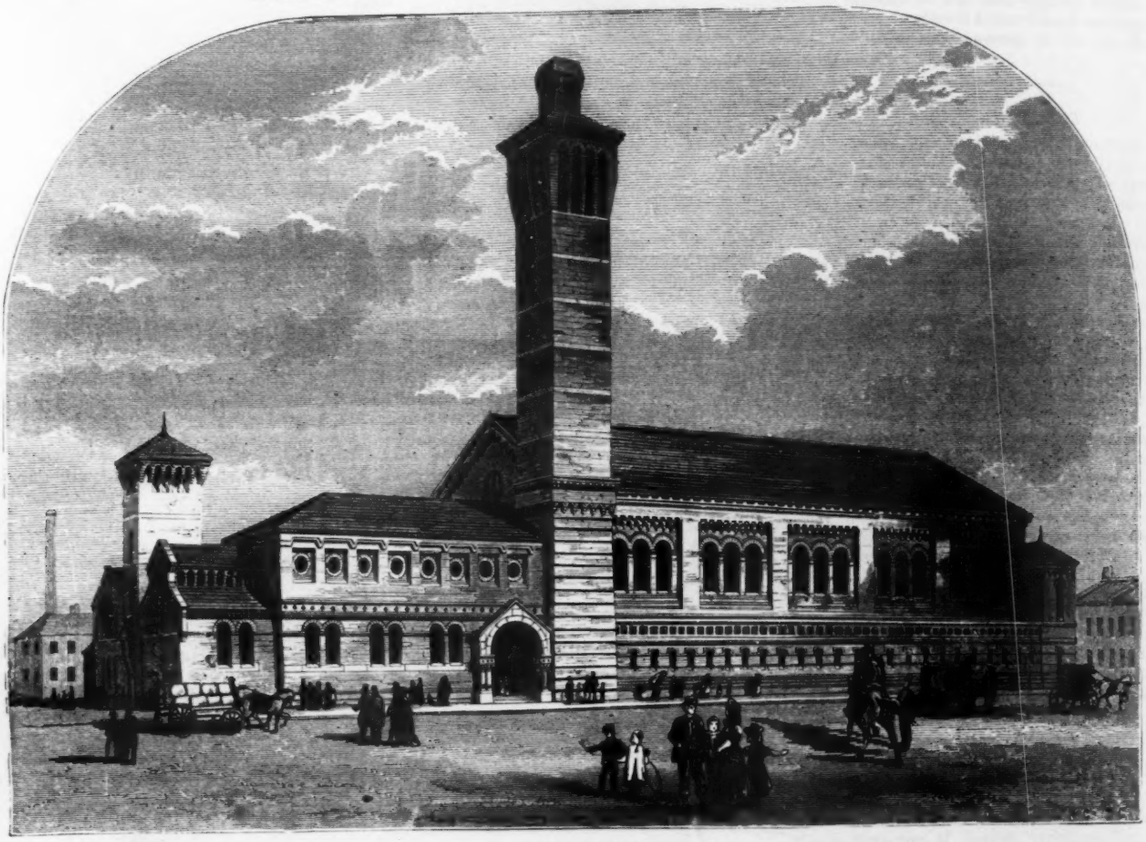
A PROFESSIONAL GATHERING.

ON Wednesday last Sir Digby Wyatt entertained at dinner a number of the members of the Royal Institute of British Architects invited to meet the new President, Mr. T. H. Wyatt, including Professor Donaldson, Professor G. G. Scott, Mr. Pennethorne, Mr. B. Ferrey, Mr. C. C. Nelson, Mr. G. E. Street, Mr. F. Marrable, Mr. P. C. Hardwick, Mr. Godwin, Mr. T'Anson, Mr. Penrose, Mr. E. Christian, Mr. E. M. Barry, Mr. Horace Jones, Mr. Owen Jones, Mr. David Mocatta, and Dr. James Fergusson. In reply to the only one toast given, "Prosperity to the Institute," the President, in a few well-chosen sentences, expressed his desire to maintain its dignity, and that of the profession generally. Professor Donaldson alluded to the meeting about to be held with a view to the completion internally of St. Paul's, as a matter interesting to architects; and Mr. Penrose, on the part of the Dean and Chapter, bespoke the good offices of all there.

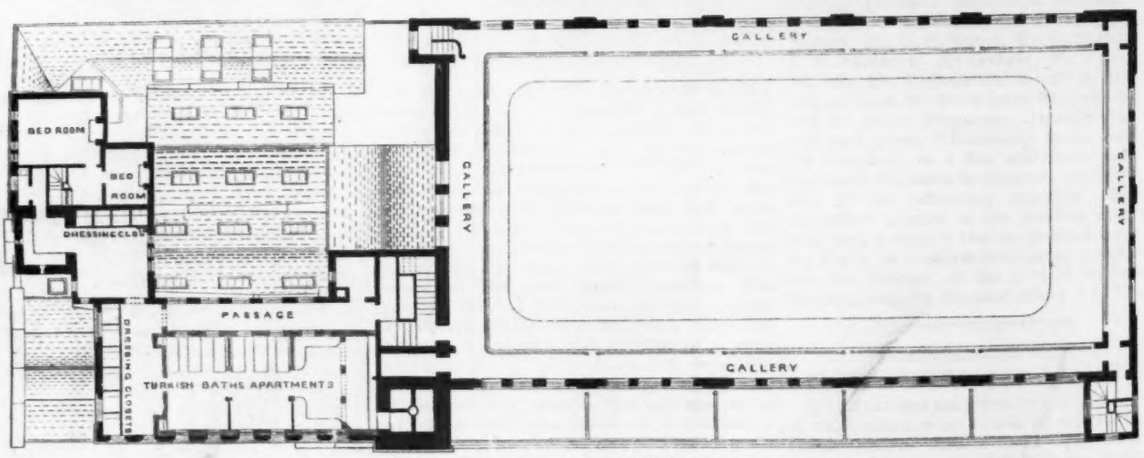
CORPORATION BATHS, ASHTON-UNDER-LYNE, LANCASHIRE.

ILLUSTRATIONS are given in our present issue of the Baths now in course of erection for the Corporation of Ashton-under-Lyne, from the designs of Messrs. Paull & Robinson, architects. The covered bath, it will be seen, is of very considerable size. Around it is a gallery. During the winter months it is proposed to floor over the space otherwise occupied by water, and convert the interior into a gymnasium. The remaining one-third of the area of the site is occupied as follows, namely: a plunge-bath for females, having a water area of 25 ft. by 18 ft., where the lasses of Ashton may learn to swim; six first-class and thirteen second-class private baths, so arranged as to be accessible for men and women, as may be required; a dwelling-house for the manager or curator in charge of the premises; and a complete set of Turkish baths. The last-named are placed in a story above the ground floor, and flank the ventilating shaft next Henry-square, thus giving height and importance to the principal façade. The women's plunge-bath will be furnished with two sets of dressing-boxes, on the same principle as the great swimming-bath. It is also arranged for access from the principal entrance, in Henry-square, as well as from the women's entrance, in Portland-street, so that when the latter bath is used as a gymnasium in winter, the smaller bath may be used for men also. It only remains for us to state that the style of the building is Romanesque, and that the exterior is of brickwork throughout, stone being introduced only where absolutely necessary for constructive purposes.

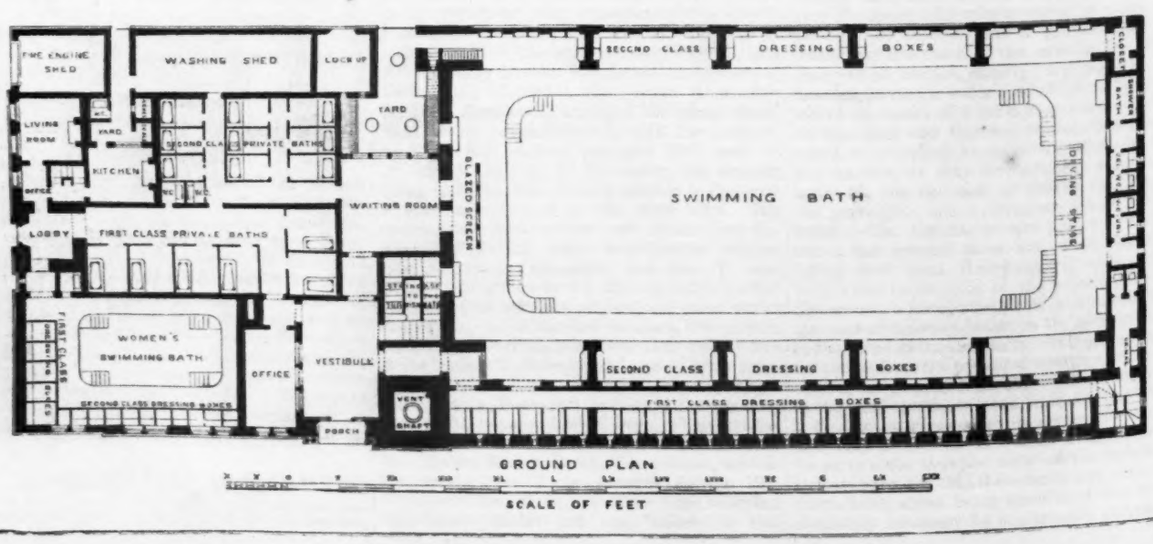
CORPORATION PUBLIC BATHS, ASHTON-UNDER-LYNE.



EXTERIOR VIEW.

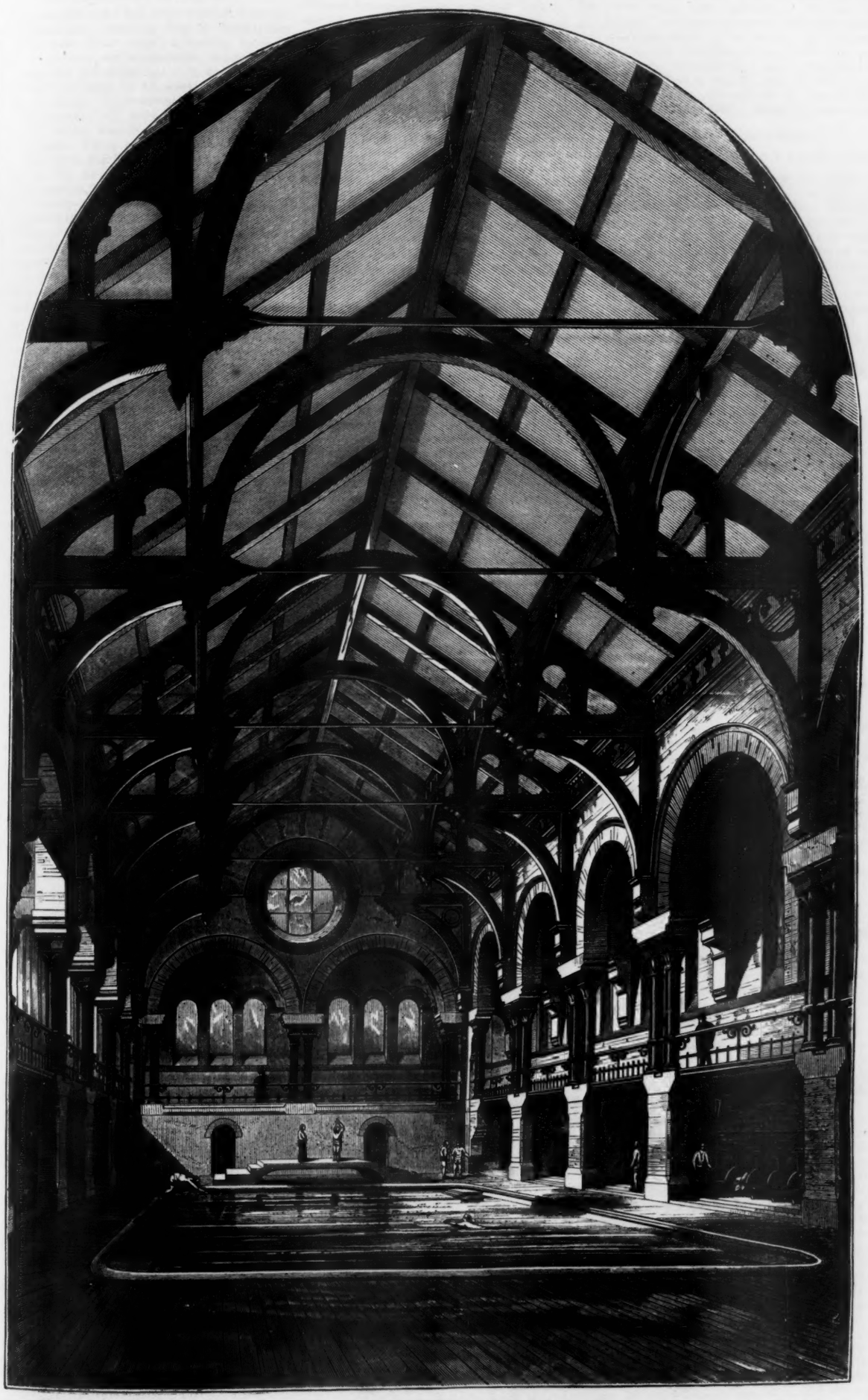


FIRST FLOOR PLAN



GROUND PLAN

SCALE OF FEET



CORPORATION PUBLIC BATHS, ASHTON-UNDER-LYNE.——MESSRS. PAULL & ROBINSON, ARCHITECTS.

THE SEWAGE QUESTION.

Newent.—An order has been received from the Home Secretary, directing that in three weeks from the date of the order, a meeting shall be called at Newent, and a committee formed there, to carry out the Sewerage Act, and that the work must be begun in six weeks from the date of the meeting. If the committee is not formed the Government will send down an inspector, who will employ men to begin the work at the time named. There are great complaints that the area upon which the rate will fall, as laid down by Mr. Arnold Taylor, is not extended enough, especially in some directions.

The Treatment of Liquid Sewage.—An occasional summary of what is being done is useful. At fifteen of the places which are sewered wholly or partially, the liquid sewage is subjected to treatment, either by allowing it to remain for a time in settling-tanks, from which the deposit is occasionally removed, as at Burton-on-Trent, Birmingham, Epsom, Fareham, and Andover; or by filtering, as at Uxbridge and Ealing. In eight instances, deodorising materials are added to the sewage. Lime and carbolic acid are used at Carlisle and Harrow; lime alone is used at Leicester; lime and chloride of lime at Luton; perchloride of iron at Cheltenham; perchloride of iron and lime at Northampton; ferruginous clay treated with sulphuric acid at Stroud; and at Leamington, the lime treatment has lately been superseded by the method proposed by Messrs. Sillar & Wigner. By this treatment the sewage is clarified, and a deposit is separated which is sold as manure. In regard to the effects thus produced, it is stated that at Leicester the sewage runs off as pure as ordinary rain-water; at Ealing, it is said to be free from smell, colourless, and harmless to vegetable or animal life; at Stroud and Luton the effect is stated to be satisfactory; at Harrow the nuisance is said to be somewhat mitigated; and at Abergavenny the stench is said to be abated, by the treatment of the sewage. At Bury St. Edmunds, upward filtration through charcoal and gypsum has been abandoned, as too costly, in favour of irrigation. At Banbury, treatment of the sewage has failed, and irrigation is now resorted to; at Hereford, where it was proposed to be adopted in the Parliamentary plans, it has not been tried, on the score of expense; at Tonbridge it is about to be tried; and at Hastings and Cambridge experiments are being made. The cost of treatment amounts to 1,200*l.* a year at Leicester, for a population of 89,000, discharging into the sewers; at Ealing, with a population of 7,500, the annual cost is 300*l.*, and the cost of the plant for the purpose was 3,000*l.*; at Luton, with a population of 18,000 the annual cost is 500*l.*; at Cheltenham, with a population of 36,000, it is 350*l.*; at Uxbridge, with 7,000 population, it is 200*l.*; and at Alton, with 3,300 population, it is 46*l.* The solid deposit obtained by treating liquid sewage is sold at prices varying from 6d. to 2s. 6d. per ton. At Leicester as much as 5,000 tons is produced. At Luton, the deposit is mixed with night-soil; at Banbury, with street-sweepings; and at Stroud it is made the basis of a manure that is said to be sold at 7*l.* 10s. per ton.

FREE LIBRARIES IN LONDON.

SIR,—I have read with great interest the excellent letter of your correspondent "Jack Plane," on the necessity of free libraries in London.

If, as he says, ratepayers will not, as yet, submit to compulsory enlightenment, as represented by a free library rate, is it not possible that well-directed voluntaries might commence the task, and leave a converted Bumbledom to complete it?

Some months since, it was suggested by the Workmen's Club and Institute Union, 150, Strand, where, if I mistake not your correspondent, "Jack Plane," is well known and appreciated, that a free library, in conjunction with a workmen's hall, might be established as a fitting memorial of Lord Brougham. Whether or no the times are ripe for a proper recognition of Lord Brougham's services, I cannot say; but, as yet, the response to the proposal of the Working Men's Club Union has been but small. During the last few weeks, however, we have suffered a loss which, as it affects popular literature, is perhaps even greater than that of Lord Brougham, who died in a ripe old age, when his work was done. I need hardly say, I allude to the loss of Charles Dickens. Would not a free library as a monument to Charles Dickens be a more noble memorial than all the statues or obelisks that the admiration of his countless readers may suggest? I now only make the general suggestion; but I feel certain that others, with larger leisure than myself would soon be found to organise the work and carry out the details, if, as I believe would be the case, the public mind responds to the suggestion.

Only last Friday evening, the manager of a small but thoroughly self-supporting workmen's club, in a densely-populated part of London, said to me, in speaking of the slender library now at the command of its members, "If we could get a set of Dickens's, we should double our number in a month." With half a dozen free libraries in the various districts of the metropolis, the good and gracious creations of Dickens's genius would be as familiar as his name now is to the masses of the people. Let the Dickens Free Library be started at once.

ALSAGER HAY HILL.

TO WHOM ARE WE TO LOOK FOR PAYMENT?

SIR,—An architect calls on a manufacturer, and orders some work, and names the builder who is to send sizes and measurements, and the builder sends his cart for the work when done, and the manufacturer books the work to the architect, as he had not given up the name of his principal. On applying for payment to the architect, the manufacturer is put off with the name of the builder. The principal then writes to the manufacturer, advising him to get his money from the builder, and speaks of the architect as having been employed by him.

Is not the principal liable to pay for the work, or is the manufacturer to look to the builder only, of whom he may have no knowledge?

P. & SONS.

*** The architect would, doubtless, be liable, unless he made his position clear at the time; and he would have his remedy as against the person for whom he acted.

DRINKING FOUNTAINS AND CATTLE TROUGHS.

THE eleventh annual meeting of the Metropolitan Drinking-fountain and Cattle-trough Association was held on Saturday afternoon last. The report showed that the society have now 130 fountains and 132 troughs under their care; that the consumption of water at some of the larger troughs amounts to between 2,000 and 3,000 gallons a day; that in some instances a single trough thus involves a cost of from 20*l.* to 30*l.* a year, and that in one parish alone the water company's accounts against the society, for 1869, exceeded 200*l.* It is to the erection of new troughs and to the efficient working of troughs and fountains already erected that the general contributions of the society are now exclusively devoted, the erection of new drinking-fountains for the people being commended to the philanthropy and public spirit of private individuals. The ordinary donations to the society for the year have amounted to 1,645*l.*, the donations for special fountains and troughs to 194*l.*, and the annual subscriptions to 881*l.* Mr. Smithies, in seconding the adoption of the report, expressed a hope that the committee would persevere in their exertions for the restoration of the Snow-hill fountain, at the corner of St. Sepulchre's Church. It was the gift of Mr. Samuel Gurney, and much historical interest attached to it as being the first fountain ever erected in London, but it had been taken down in consequence of the alterations in connexion with the Holborn Viaduct. Mr. Gurney, the chairman, announced that a lady had forwarded 1,000*l.*, this being the third sum of 1,000*l.* which the society had received from the same anonymous donor.

BRIBING A CLERK OF WORKS.

AT the usual meeting of the Metropolitan Board of Works on the 24th ult., it was stated in one of the reports presented by Mr. Bazalgette, the chief engineer, that two of the contractors executing works for a company, but over which this Board had supervision and control, had paid to one of the clerks of works employed by the Board to see that the work was properly done, the sum of 5*l.*, to induce him, it was supposed, to neglect his duty. This man, however, instead of doing so, reported it to his superior officer, the chief engineer, Mr. Bazalgette, who now reported it to the Board. Several members expressed their approbation of what the clerk of the works had done, and it was agreed that the names of the two contractors, with the letter they sent to the clerk of the works enclosing the 5*l.* note, should be printed in the minutes, and sent to all the vestries and district boards in the usual manner,—a scarecrow.

OPENING OF KEBLE COLLEGE, OXFORD.

THE closing event of the commemoration week at Oxford was the opening of the new college erected to the memory of the Rev. John Keble, author of "The Christian Year," who died about four years ago. The last occasion on which a new college was added to the University was in 1714. It is intended that Keble College shall offer a religious education on Church of England principles to a class of men who are now shut out from the complete advantages of university training by the high charges made in other collegiate foundations. The want of such an institution was often expressed by Mr. Keble himself. About 44,000*l.* have been already contributed, leaving a deficiency of 6,000*l.* The building, capable of accommodating 100 undergraduates and an adequate staff of tutors, is now complete, with the exception of the hall and chapel, which are only temporary erections. The college will be open for the reception of a few students in October of this year.

DISTRICT SURVEYORS' FEES.

TUBB V. GOOD.

SIR,—As this case when before the magistrate was reported in your journal, we think that a report of the judgment of the Court of Queen's Bench, reversing his decision, will be of service to your readers.

The point raised by the case was upon the construction of the 51st section of the Metropolitan Building Act, 1855, which states that the district surveyor shall be entitled to receive the amount of his fees from (among other persons) "the owner" of the building erected, or in respect of which the work or service has been by him done or performed; and the question for decision was whether the district surveyor was entitled to recover his fees from an owner of the building who became owner thereof *after the fees had become due.*

The Court of Queen's Bench has unanimously decided that the word "owner" refers to the person who was owner within the meaning of the Act at the time when the fees became due, and that subsequent owners are not liable to pay the same.

APPLEBY, WRIGHT, & CROWTHER.

DRAINING WITHOUT SCIENCE.

SIR,—"M. U." is wrong in attributing the depletion of our great water-basins, or the barren appearance of our fields, to *draining without science*, &c. My own experience assures me that drained lands retain considerably more moisture than undrained, by the water being distributed more equally throughout the under-surface, beneath the drains, and beyond the influence of evaporation. Not only do the rains descend, as our friend poetically remarks, to be kissed and embraced, but the loving earth reciprocates and faithfully retains the gushing shower, till there is a little too much of it, and even *then* does not part with it *too* readily. Floods, it strikes me, are more frequent in countries where subsoil drainage is not attended to, non-paying, or impracticable, such as thin, hot soils, moor, or mountain. An exceptionally dry season or two not being sufficient to keep up the supply from the great absorbing surfaces to the reservoirs in the basins below, whilst a constantly increasing demand is made on these for the use of an ever-increasing population in our great cities, keeping the huge steam-pump ever going to provide pure water for mankind; and numberless steam-horses employed in every branch of trade and manufacture, *may* perhaps account for the want of this great element,—certainly not the drainage of bog and swamp, whose *impervious* bottom only retains just sufficient water in dry seasons to fill the land with pestilence and death. The drainage of a city, un-utilized, is a frightful waste and a national evil; the drainage of the land is, on the contrary, a national benefit.

A CLOD.

WATER SUPPLY.

THE Maidstone Waterworks Company have for some time been sinking a well at their works at East Farleigh, and the result is a success. After sinking 400 ft., a boring was made for 193 feet further, and, after passing through the Wealden clay, a stratum of sand was entered, in which so plentiful a spring of water was found that the well was soon filled nearly to the surface, and several feet above the level of the river. Whether the supply will be permanent remains, of course, to be tested by boring still deeper, which we understand will be done, and the quality of the water has equally to be proved; but the indications at present are that, both in point of quantity and quality, the new supply will fully meet the public requirements. The result has also some scientific value, of which geologists will, doubtless, know how to avail themselves.

Professor Runge has made observations on the purification of water, which offer some interesting points. His conclusion is, that metallic iron offers the readiest and simplest means of disinfecting water, and of preserving it fresh. Thames water taken to sea in iron tanks soon becomes perfectly sweet, and remains so through a long voyage. A small piece of sheet iron or some nails placed in the water in which cut flowers are put will keep the water sweet and the flowers fresh for a long time. He also put some iron filings in a vessel with a very small quantity of water, and placed a leech therein, and found the water quite fresh and the leech healthy after six months had passed.

COMPLETION OF THE LOW-WATER PIER AT CARDIFF.

THE completion of this pier is looked upon as an important event at Cardiff. The first pile was driven in August, 1867, and the last in August, 1868. The work is now finished, and the pier will very shortly be opened. In the first twelve months forty-eight rows of Memel piles were driven in, there being six piles in every row, and the rows are 24 ft. apart. Each pile was driven down about 40 ft. below the surface of the mud, where it found solid resting-place in the gravel substratum, or in firm ground of some other nature. The pier is constructed throughout of timber, in bays of 25 ft. for two-thirds of the distance, and 16 ft. for the remainder, and two rows of continuous wrought-iron girders run down the centre of the pier from end to end. It is 1,350 ft. in length, and 34 ft. 6 in. in width, except at the end, where it is widened to 100 ft. Here, at the end, to give it additional strength, and to preserve the main piles from injury by vessels, fender piles of elm have been driven in. In the construction of the pier alone, exclusive of the station and waiting-rooms, 150,000 cubic feet of timber have been used. The pier is approached from the East Dock by a carriage road running over an embankment behind the coffer-dam, which closes the entrance to the old Tidal Habour. It is approached also by railways. The roadway is of planks resting upon the piles, and is protected by a wooden railing. A covered railway station is built above the pontoon. This station is 108 ft. in length, and 20 ft. in height. Throughout its length runs a platform raised to a level with the carriage steps. A light tower some 40 ft. high is surmounted by a dioptric light, around which runs a gallery.

The whole of the work has been carried out by the trustees of the Marquis of Bute, and from the designs of Mr. J. McConnochie, C.E.

NEW MUSEUM OF COMPARATIVE ANATOMY, CAMBRIDGE.

THE New Museums and Lecture Rooms Syndicate have reported to the Senate on the subject of the roof of the New Museum of Comparative Anatomy as follows:—

"Almost immediately upon the completion of the building in the year 1865, the roof was found to be defective. The attention of Mr. Salvin was at once called to the matter, and he was requested to come to Cambridge for the purpose of inspecting and reporting upon it. Mr. Salvin accordingly came, and stated that Messrs. G. Smith & Co., the contractors, would remedy the defect without expense to the University. In accordance with his recommendation, in the spring of 1866 certain tie-rods were added to the principals, and it was asserted that the mischief was remedied. This was, however, far from being the case. Early in the year 1869 the superintendent of the museum pointed out to the Syndicate a number of very serious defects. The roof was then examined by Mr. Goddard, architect, of Lincoln, and by Mr. A. J. Gray, the builder, of Cambridge, and the defects traced to the original defective construction of the roof, the condition of which at that time (June, 1869) was described to the Syndicate in the following terms:—

'The elliptic longitudinal arches are too weak at the crown to support the incumbent weight, and the iron tie-rods put in by Mr. Salvin after the completion of the building wholly fail to remedy the original defect; the roof is, in consequence, bent into hollows between the supporting wooden pillars, the windows are displaced, and the water in the gutters unable to find its way into the downright pipes.' The Syndicate were further informed that, 'through an original defect in the construction, which was not remedied by Mr. Salvin's subsequent application of iron tie-rods across the building, the supporting wooden pillars, as well as the external walls, were thrust out of the perpendicular,' and that, 'from the above-mentioned causes the roof had become separated from the end walls, and was already in some places more than half an inch from them.'

The Syndicate at once laid the information which they had received before Mr. Salvin, with a request that he would give his early attention to the subject, which he promised to do. Nothing more having been heard from Mr. Salvin in October, 1869, when the Syndicate first met after the long vacation, the Syndicate again addressed him, and it was ultimately (November, 1869) agreed between him and the Syndicate that the building should be examined by two practical persons, one appointed by Mr. Salvin and the other by the Syndicate. Mr. Salvin appointed Mr. Bromwich, builder, of Rugby; the Syndicate, Mr. Arthur John Gray, builder, of Cambridge. It does not appear that there has ever been any question between the two referees respecting the defects of the building, but they have not been able to agree upon the proper mode of making them good, Mr. Bromwich proposing a plan in accordance with which he maintains that all defects may be made good for an outlay of 115*l*., Mr. Gray contending that the plan proposed would not remedy the original errors of construction, but would leave the roof still insecure. The plan which Mr. Gray suggests, as the least expensive that he can devise with the full assurance of its being effectual, will require an outlay of 350*l*. In the end Mr. Bromwich has, on behalf of Mr. Salvin, offered the following alternative,—viz., either to put the building into proper repair in accordance with the plan which he had proposed, or, if the Syndicate preferred some other plan, to pay the sum of 135*l*. in satisfaction of all claims upon Mr. Salvin. The Syndicate, having examined both Mr. Bromwich's plan and that of Mr. Gray with great care, have come to the conclusion that Mr. Gray's objections to Mr. Bromwich's plan are sound, and that they could not safely recommend it to the Senate. On the other hand, they are decidedly of opinion that Mr. Gray's is a satisfactory plan, and the best which can be adopted under the circumstances, and they recommend that his estimate and specifications be accepted, the balance of the expense being charged to the New Museums and Lecture Rooms Building Fund. And although they cannot regard the offer of 135*l*. made by Mr. Bromwich on behalf of Mr. Salvin as a proper or adequate offer, yet, having regard to all the circumstances of the case, they recommend that it be accepted."

REMOVAL OF WHITEWASH.

SIR,—Can any of your readers give information of a sure and economical mode of removing old whitewash from the exterior walling of a brick church now being restored?

E. K.

A READY-MADE IMPROVEMENT.

COVENTRY-STREET AND OXFORD-STREET.

To utilise the existing lines of streets now closed against traffic, which is struggling in all directions to get the nearest way to various points, is at once the simplest and cheapest, as well as the quickest, way of giving relief to this over-crowded city; and we are glad to observe that there is one vestry, at least, which is alive to the importance of brisk and ready action, when opportunity occurs.

It seems that very favourable circumstances now exist, whereby a direct route from the centre of Oxford-street to Coventry-street can be opened almost immediately; and "the Crown," for once, is ready to assist, and actually promotes, this public improvement. Between Berwick-street (which is in a line with Wells-street, on the north side of Oxford-street) and Rupert-street is a block to remove which would, in itself, be a boon, but which, if removed, would open up the route indicated above. Quite lately a fire occurred, which has reduced the difficulties originally existing, by destroying one side of a court, that would have been required to have been set back; and it only remains to set back the side of one court (Walker's-court), and remove one house, to have the line complete. The following quotations from a statement made by the worthy and energetic clergyman of the Church of St. Luke, situated in the midst of the district, will show that the matter was under consideration as long ago as 1863, when—

"An attempt was made to effect the improvement indicated. The matter was brought before the vestry, by a very influential deputation, headed by the present Lord Derby. The result was the rejection of the scheme by a very narrow majority. . . .

At the present moment the difficulty is somewhat diminished by the destruction, by fire, of three of the houses in Crown-court, which stood in the way of the improvement.

As to the expense, I believe I am justified in thinking that you would now find the terms offered by the Metropolitan Board of Works more favourable than they were seven years ago; while all the arguments hitherto used to show that the parish would find a fair return for its outlay in the diminution of poor and police rates are as strong as, or stronger than ever. I have already referred to the liberal offer of the representatives of the Crown property which stands in the way; and the interest of the Woods and Forests in it is offered for the nominal sum of 1*l*., so convinced are the owners that the junction of Berwick-street and Rupert-street would enhance the value of the neighbouring property."

We must congratulate the west end of London on the action already taken by the St. James's vestry, where the subject is under serious consideration.

THE VOLUNTARY ARCHITECTURAL EXAMINATION.

IT has been announced that six candidates presented themselves at the Institute of Architects for examination this year in the Class of Proficiency, and that of those gentlemen, the four following passed:—

Thomas E. Mundy, Park-lane, Tottenham; William Scott, 22, Horsemarket, Northampton; Walter L. Spiers, 21, Bernard-street, Russell-square; John S. Quilter (Associate), 9, Conduit-street;

and that in the preliminary examination, established this year, four candidates had come up for examination, of whom the three following passed:—

Joseph B. Cohen, 15, St. John's-terrace, Regent's Park; Thomas Garratt, Priory Cottage, Northampton; Thomas J. Street, Manor House, Sutton, Guildford.

In conformity with the present regulations of the examination, certificates will shortly be issued to all candidates who have passed in the respective classes of proficiency and distinction.

THE PLYMOUTH TOWN-HALL TENDERS.

AT a special meeting of the Plymouth Town Council, to consider a report from the Guildhall Committee of the tenders received by them for the erection of a new Guildhall and Public Buildings, the following tenders were presented:—

	For the entire Buildings.	Reduced Buildings.
Hunt & Seacombe, Exeter	£57,508	47,000
Shaddock, Saltash	44,900	36,400
Blatchford, Tavistock	38,404	31,785
Clarke, Plymouth	37,180	30,778
Clark, Bath	35,445	29,168
Harvey, Plymouth	33,997	28,111
Finch, Plymouth	33,687	27,988
Marshall, Plymouth	33,500	27,500
Matcham, Plymouth	33,415	28,234
Futcher, Salisbury	32,650	25,318
Call & Pethick, Plymouth	32,475	26,994
Trevena, Plymouth	28,989	£24,089

The reduction in the buildings consists in the omission of the tower, of the third law court, and the buildings adjoining Westwell-street connected therewith. After some discussion and several motions, it was resolved, by a majority of 21 to 10, that the tender of Messrs. Call & Pethick for the whole work be accepted.

AN EPITAPH IN ALL SAINTS' CHURCH, LEICESTER.

SIR,—I send you a relic of the past which I found hanging in this fine old church, which is sadly in want of restoration, or it will tumble down.

The charity now amounts to 20*l*. a year, and is disposed of as follows:—10*l*. are paid to the Vicar of St. Nicholas; 3*l*. 6*s*. 8*d*. to Trinity Hospital; and 6*l*. 13*s*. 4*d*. to ten poor persons. H.

"In this churchyard doth lye the corps
Of William Norrice, dead and gonn,
Whose grave from all the rest is knowne
By finding out the greatest stone;
A homely tombe, yet grac'd with fame
Of worthy works which he had don;
A monument which he did choose
Before his howre-glasse was runn.
Thrice fifteene groats he did bestow,
Which yearly ever shall renew,
And to be given to All Saints poore
On the frast day of Barthol'mew.
O, happy All Saints that hath bredd
Such saints on earth to feed thy poore;
Let saints in Heaven and earth below
Give prayses to the Lord therefore.
Five marks he gave unto the schoole,
An annual stipend for to bee,
And that it shall be yearly pay'd
To the second Master of the three.
There was he grac'd with serving twice*
The office of the Majoralтye;
Three wives he had, and had his will
To be entombed amongst them three.
But death, the end of flesh and blood,
Did wound to death the good old man;
Though ninety-six yeares liv'd on earth,
Yet was his life in length a span.
J. B.
1615."

* On the board opposite is, "He departed this life January 8th, 1615."

CHURCH-BUILDING NEWS.

Darlington.—The chief stone of a new church for St. Paul's district, Darlington, has been laid. There remain only about 600*l.* to be raised to meet the cost of erection. The designing and carrying out of the new work have been placed by the committee in the hands of Mr. J. P. Pritchett, of Darlington, architect. The church is designed in the Early Decorated style, and consists of nave, 75 ft. by 26 ft.; chancel, 28 ft. by 22 ft.; aisles, each 75 ft. by 14 ft.; vestry, organ-chamber, and a tower and spire at the south-west angle of the nave, 130 ft. high. The west end, which faces Durham-road, has a doorway in the centre, with a large three-light window over it; the end of the north aisle being relieved by a two-light window, and the end of the south aisle being finished by the tower. The sides of the aisles are pierced by two-light windows, separated by buttresses, and a lofty clearstory is similarly arranged. The east end is filled by a large four-light window, the sides of the chancel by long two-light windows, and each gable is surmounted by an ornamental cross. The tower is divided into four stages, the first being a porch, the second the ringing chamber, the third the clock-chamber, the fourth the belfry, and a spire surmounts the whole. Internally, the nave is separated from the aisles by five arches, springing from pillars, with moulded bases and caps, which will be relieved by a little carving. The roof of the nave is lofty, and open to the ridge; that of the chancel "wagon-headed" or arched. The seats are all to be of pitch pine, open, with low slanting backs and moulded ends, and provide accommodation for 600 adults. The floors of the chancel and passages will all be paved with Mosaic tiles. The pulpit and font are to be of Caen stone; the reading-desk of oak; the communion-rails of iron and brass. The windows are all to be filled with cathedral tinted glass, having coloured borders. The woodwork will be stained and varnished. The church will be warmed by hot water or warm air, and lighted by gas standards. The site, which consists of an acre of ground standing high and open, is surrounded on all sides by streets, from which it will be separated by iron railing. The contracts have been taken by the following local tradesmen:—Masons', slaters', plasterers' work, Mr. W. Lynes; joiners' work, Mr. T. Teakstone; plumbing and glazing, Messrs. Russell & Sons; painters' work, Mr. Stephen Harrow. The amount of contract is 3,304*l.* 16*s.* 7*d.*, and the total cost, including iron railing, lighting, warming, and professional charges, is expected to amount to about 4,000*l.*

Preston. — The new tower of St. Mark's Church has been formally opened. Mr. William Johnson, of Howden, Yorkshire, brother of the incumbent, was the architect. The tower has been for some time completed externally. It is built of Longridge stone and is a lantern one, in the lower part consisting of eight three-light windows, two on each side, divided by buttresses and glazed with cathedral glass. Under each transom is filled in with tracery. The belfry windows above are divided into two lights by a transom, and the tracery on the top is filled in with cathedral glass. At the south-east corner is a staircase by which to ascend to the top of the tower. The louvres of the upper lights are of Westminster slate. The gablet rising over each belfry window is intersected about midway by a parapet pierced with quatrefoils, and terminating with a finial. There are octagonal pinnacles at each corner, canopied at the base of the spiral part of the pinnacle, likewise terminated by a finial and wrought-iron vane. The total cost of this addition to the church is from 1,250*l.* to 1,300*l.*

Brent, Devon.—The parish church of Brent, in South Devon, which is at present in a very decayed state and much overlaid with whitewash, is about to be completely restored, under the direction of Mr. Hine, of Plymouth. The building is chiefly Perpendicular, with a tower and some other portions of earlier construction. The chancel contains a Late Decorated sedilia and an elaborate oak screen, the carving and colour of which will be restored. The roofs and seats throughout will be new, and much of the stonework will be removed. The chancel and passages are to be paved with tile and slate, and the pulpit is to be of stone. Like so many even of the late churches in the West of England, Brent Church possesses a Norman font, which will be placed near the western entrance, on a granite base, cruciform on plan. The cost of the various works will be about 1,700*l.*

Walworth Common.—St. Stephen's Church, in Villa-street, the laying of the foundation-stone of which we recently noticed, will be in the Gothic style of Early Italian character. The walls will be built of brick, and faced inside and out with Beart's perforated white bricks. The arches of the nave supporting the clearstory will be constructed with white moulded bricks and red terra-cotta, which have been specially manufactured by the Whitwick Colliery Brick Company, Leicester, from the designs of the architects, Messrs. Jarvis & Son. The dressings to doors, windows, buttresses, &c., will be of Bath stone. The church will consist of a nave, north and south aisles, and chancel. The nave will be 81 ft. long, 30 ft. wide, and 50 ft. high, lighted by ten two-light clearstory windows, and covered with a close-boarded arch-shaped roof. The north and south aisles will be 81 ft. long and 8 ft. wide, with lean-to roofs. At the west end of the building will be a spacious porch or narthex the whole width of the nave. There will be also a porch in the north aisle facing the new road. The chancel will be 28 ft. deep, 22 ft. wide, and 36 ft. high, terminated by a three-sided apse. It will have a vaulted roof constructed of concrete, supported on moulded stone ribs. There will be three lancet windows in each of the seven bays of the chancel, and beneath these there will be a deeply-recessed arcade. At the south-west corner of the church there will be a tower, 22 ft. square, which will rise to a height of 120 ft., and be constructed to receive a peal of bells. Sittings will be provided for 614 persons on the ground-floor, and 153 in a west gallery. The seats will be open, of deal stained and varnished. The contract is taken for the works, exclusive of the tower, by Mr. Tarrant, of the New Kent-road, for the sum of 5,186*l.*

York.—A reredos, composed of painted tiles from the studio of Mr. J. W. Knowles, York, has recently been erected in St. Sampson's Church. The central portion, which is inclosed in a carved stone frame, is designed to form three quatrefoil panels, divided by small elongated niche panels. In the centre quatrefoil, on a diapered blue ground, is the Agnus Dei, and in the side quatrefoils are angels. In the small panels a conventional treatment of the rose and lily is painted on a chocolate ground. The space under the central portion of reredos, which occurs at each end of the communion-table, is of a diaper in maroon, yellow, blue, and white. The wall space on each side of reredos, extending to the chancel side walls, is also of tiles, on which is painted diaper work. The stonework and fixing of the tiles were executed by Mr. Cole, of York.

Horsmonden. — A chapel of ease to St. Margaret's, Horsmonden, has been opened and consecrated by the Bishop Suffragan, of Dover. The chapel is situate in the most central spot obtainable in the parish, more than two miles from the parish church. The site was the free gift of Mr. Ernest Wilson. The chapel is built of brick, and consists of nave, apse, chancel, and vestry, the bell-turret being over the chancel arch. It will seat about 150 persons. For the exterior walls stock bricks are used, with bands of red and black bricks, the arches of doors and windows being of the same material. For the internal walls red bricks are used, and relieved by strings of white and black brick. The style of architecture adopted is the Early Decorated. The ceiling of the chancel is panelled and moulded, and coloured with a groundwork of blue, with gold stars. At the junction of the apse the mouldings radiate with gold lines from a centre bearing the sacred monogram. In the cornice is painted an inscription from "The Litany," commencing with "By the Mystery of Thy Holy Incarnation." The chancel is lighted by six single-light windows, the centre one being filled in with stained glass by O'Connor, representing the Crucifixion; it has been presented by the Dowager Lady Marriott. It is proposed to fill in the remaining windows with glass, illustrative of the inscription in the cornice above. On the north side of the chancel is the vestry, divided from the former by an archway, terminating with moulded corbels. The organ, by Messrs. Lewis & Co., of London, fills up the archway, and has an oak case, with spotted metal pipes. The chancel is seated stallwise, with wainscot oak stalls. The chancel arch has a span of 17 ft., and springs from corbels, consisting of polished Greek marble and carved capitals, terminated with figures of angels. The floors are laid with Minton's tiles. The roof of the nave has all the rafters framed alike. The seats are of a plain character, and, together with all the woodwork in this part of the church, are stained and varnished. What has been completed was planned by Mr. Robert Wheeler, of Tunbridge Wells, architect, and executed by Mr. Anscomb, of Maidstone; the carving by Mr. Earp, of Lambeth.

Youlgreave. — The restoration of the parish church is drawing towards completion. The roofs had been neglected for many years. The lead had been patched over and over again, but the rain came through in streams, and this, of course, kept the whole of the oak beams continually wet, and consequently decaying. When contracts were entered into, and the work commenced, the worst fears were realised. Nearly all the rafters were decayed, the boarding under the lead entirely, and many of the main beams were in a very critical state. It was determined, however, to retain every portion of the old work that could be retained. A sort of framework of iron was therefore placed above the old oak roof, having iron beams over the old oak ones, to which the latter were secured by large iron bolts. All the intermediate timbers were similarly secured. The decayed rafters were all removed and new ones inserted, and the whole reboarded and covered with new lead. The aisle roofs were, fortunately, not in such bad condition, but were all stripped, the decayed portions cut out, and new oak inserted; and were reboarded and covered with lead. With the limited funds in hand it was impossible to attempt the reconstruction of the chancel roof. In this emergency his grace the Duke of Devonshire was appealed to,—already a donor of nearly 800*l.* to the restoration fund,—and he at once directed the work to be finished as it ought to be, and undertook to defray the whole cost of this portion. What is, in effect, a new roof, has been put to the chancel, in which the old beams and other portions of the old roof are plainly visible from the darker colour of the oak. The chancel walls are lined with ashlar. A new east window has been inserted. The levels of the chancel have been raised. The floor is all laid with encaustic tiles, interspersed with bands of white stone. An attempt has been made to introduce colour in the lower portion of the chancel walls by the use of tiles. They are a sort of majolica ware. The rest of the church has been paved with tiles, with wood floor under the seats, and a heating apparatus has been placed in a vault under the church, by Haden, of Trowbridge.

Rochdale.—The foundation stone of a new church at Facit, near Rochdale, to be dedicated to St. John, has been laid. The design for the church comprises a nave, chancel, transept, baptistry, south-west tower and spire, vestry, and organ-chamber. The building is to be of stone, mainly from an adjoining quarry. Although by the same architects,—Messrs. Medland & Henry Taylor, of Manchester,—the design differs essentially from the other new Rochdale churches.

Ashford (Derbyshire).—The little village church of Ashford, according to the *Derbyshire Advertiser*, has recently, with the exception of the tower, been rebuilt, mainly through the liberality of Lord George Cavendish, M.P. The old building possessed little architectural or antiquarian interest, and it was, besides, in so dilapitated a condition, that its reconstruction had become a work of necessity. The Tudor feeling in the old church has been maintained throughout the new work. The roofs are open-timbered, covered with tiles, and asphalted and boarded underneath. The chancel roof is, of course, the most ornate. On the south side of the church is a stone porch, a new and much-needed feature. The heads of the windows are all more or less traceried, the pattern being varied according to the position of the windows. The windows themselves are filled with glass of a yellowish tint, in small diamond panes. The old west gallery has been removed, and the tower-arch, under which is the font, has been opened out into the church. The walls are built of grey limestone, and the windows, doors, and other parts, of the yellowish local sandstone. The chancel arch is supported on corbels with carved caps, the shafts being of the Duke's red marble. The churchyard-wall has also been rebuilt, and new oak gates, with suitable stone piers, provided. The contract was taken by Mr. Joseph Brown, of Matlock Bridge. The architects were Messrs. Medland & Henry Taylor, of Manchester.

Ashford (Kent). — The restoration of the chancel of the parish church has been begun by a local firm, under the direction of Mr. Ewan Christian, architect to the Ecclesiastical Com-

missioners. The east window is to be restored and reglazed. Many of the parishioners have expressed a wish that it should be filled with stained glass. The vicar has obtained a design of the Ascension from Messrs. Lavers, Barraud, & Westlake. The cost would probably be about 400*l*.

Bishampton, near Pershore.—Excepting the tower, the old church of Bishampton has been swept away. To rebuild and furnish the body of the church the total expense has been 2,000*l*. The tender for taking down and rebuilding the edifice was 1,509*l*. 10*s*. This, which was accepted, was by Mr. Griffiths, of Eldersfield, near Tewkesbury; the highest tender being 1,877*l*. Mr. Preedy, of London, was the architect. The style adopted is the Perpendicular, and the material is stone from Inkberrow, with Bath stone facings. The new church consists of chancel, with vestry on its north side (also capable of containing a small organ or harmonium), nave without aisles, and the western tower opening into the nave. The old Norman fragments are preserved in the new structure, namely, the doorways, north and south, and some deeply splayed lights in the nave walls. The east and west windows are of three lights, traceried heads, and the side windows are of one, two, and three lights, square-headed. The Norman doorway on the north is blocked up, the principal entrance being by the south porch, which is a stone structure, having a two-light window on each side, stone benches, an open timber roof, and an exterior door of open wire lattice-work for ventilation. The roofs of chancel and nave are nearly of the same height, and are both of open timber-work, the principals of which rest on moulded and carved brackets. The floor of the whole church is covered with Lugwardine tiles, of rich patterns in red, black, and buff.

Knowle.—The foundation-stone of a new church has been laid by the mayor at Knowle. The sum raised having now reached 2,400*l*., the permanent building has been begun. Messrs. Ponton & Gough are the architects; and Mr. W. Brock is the contractor. The church is to be in the Byzantine style, and will be principally built of brick, both inside and out, with coloured stone marble, and tiles worked into the columns of the arches and the floor. The extreme size will be 120 ft. by 44 ft., and the designs provide for a sanctuary or apse, organ-chamber on the north, and two vestries on the south side of the chancel. There is to be a tower 92 ft. high at the south-west corner of the church, and a porch on the south-east. The chancel, as well as the nave, is to be 30 ft. wide; the other part of the width is devoted to aisles, which will be used simply as passages. The church will be lighted by windows on both sides, filled with ornamental glass. The sanctuary will be partly lined with marble, and the fittings of the same; red Aberdeen granite will be used in the columns of the chancel, some of which will be circular and others octagonal. There will be inlaid ornamental work between the arches. It is in contemplation to paint the dome of the sanctuary with a picture of "The Last Judgment," and to have other paintings and freestone bas-reliefs beneath the windows. The ceiling will also be decorated in colours. The roof will be covered with Bridgwater tiles, and the tower with green Westmoreland slates. There will be an oriel window in the west end, in harmony with the other parts of the building. The total estimated cost of the church is 5,000*l*. The money already collected will suffice for the erection of the sanctuary and two bays of the nave. A temporary junction of the new with the old building will then be effected, and service be conducted in this enlarged space till funds shall justify the completion of the structure. Owing to the irregular slope of the ground, the floor of the sanctuary and chancel is supported on iron girders laid on stone arches, and the space beneath, which will hold a couple of hundred people, will be found useful for practising the choir and for parochial meetings. So far the work has already progressed.

STAINED GLASS.

Long Sutton Church.—Messrs. Ward & Hughes, of London, have been engaged in placing a coloured glass window in the altar end of this church. In the top division of the circle, in the tracery of the window, are portrayed two triangles intertwined, representing the Highest, the Holy Trinity, the Triune God. In the centre of these triangles is a brilliant star, beaded in vermilion, the Star of Bethlehem. In three of the divisions of the circle are represented angels adoring the Holy Trinity. In the other two divisions of the circle are, on the left, the Dove to represent the Holy Ghost, and on the right, the Lamb of God. At the base of the circle, on the left, is an alpha, on the right an omega, and beneath them the monograms of I.H.S. and X.P. Below the tracery each of the centre lights is surmounted by a star. In the left the Holy Ghost, in the figure of a dove, is seen descending on the Saviour's head, on whom John the Baptist is pouring out of a shell the water of baptism, whilst the virgin mother is seen seated below. In the centre light, on the left of the cross on which Christ is giving up the Ghost, is represented the centurion supporting the Roman standard; below him St. John; opposite to him, at the foot of the cross, is the virgin mother, and above her are soldiers and a turbaned chief. In the lower compartment, on the left, is represented the Adoration of the Magi; in the centre, the Last Supper; and on the right, the Angel at the Sepulchre, as saying to the two Marys, "He is not here, but risen." The Latin inscription at the base signifies that the window is dedicated by his widow to the memory of John Bailey, surgeon.

Holy Trinity Church, Lickey (Birmingham).—A three-light window of stained glass has just been fixed above the altar in this church. The subjects portrayed are emblematical of Faith, Hope, and Charity; the illustration of Charity being in the centre, with the sacred monogram above, and underneath the arms of the late Baroness Windsor. The work was executed by Mr. Camm, of Smethwick, formerly principal designer to Messrs. Chance, and cost between 70*l*. and 80*l*.

St. Stephen's at Barbourne.—This church has been further beautified by the insertion of a stained-glass window at the east end of the south aisle. The window is of three lights, trefoil-headed, and in the tracery above are three quatrefoils. The principal subject spreads over the three lights, being John the Baptist preaching in the Wilderness. He is surrounded by a group of men, women, and childen, soldiers and civilians, all in the act of listening attentively to his admonitions. In the quatrefoils above are the Lamb of God and two angels. The artists were Messrs. Lavers & Barraud.

St. Jude's, Wolverhampton.—A memorial has just been erected in St. Jude's, Tettenhall-road, by Mr. Mander. The window is situated at the east end. It is, in accordance with the architecture of the church, of the Decorated period, and illustrates, in a series of canopied panels, the Life, Passion, and Glory of our Lord. The arrangement of the subjects is as follows:—On the lower tier, the Annunciation, Nativity, the Finding in the Temple, and Baptism; on the upper, the Agony in the Garden, Carrying the Cross, and the Crucifixion and the Resurrection; whilst in the tracery is the Ascension, which occupies the whole space, our Lord being represented with attendant Angels, the Virgin Mary and Twelve Apostles standing in groups below. The work was designed and executed by Messrs. Lavers, Barraud, & Westlake, of London, at a cost of 200*l*.

FROM SCOTLAND.

Kelso.—Alterations are at present being made, by direction of the Duke of Roxburghe, at the Abbey of Kelso, which will greatly improve its appearance. For many years this structure has been disfigured by a stable built against its walls. The property of which the stable is a part was purchased recently by the Duke of Roxburghe, who has now caused the removal of the stable and of an old wall, so that one of the finest views of the abbey is now again to be opened up. This abbey is one of the oldest of the Scottish abbeys of which remains of any great extent exist, having been founded by King David I., in 1128.

Miscellanea.

The Tower of St. John's Church, Cardiff. At a vestry meeting the parishioners have resolved to rebuild one of the turrets of this tower, and have requested Mr. Waring, the borough surveyor, to make an estimate and advertise for tenders. The cost, it was stated, of rebuilding, would be about 80*l*. or 100*l*.; while its repairs for a few years would be 25*l*. to 30*l*.

Refusal to Consecrate a Church.—An unusual scene of excitement occurred at a new and elaborately-finished church in West Derby, about three miles from Liverpool, which has just been erected at the sole expense of Mrs. Reade, a wealthy lady in the neighbourhood, and which was to have been consecrated by the Bishop of Chester. At the last moment the bishop refused to consecrate the edifice. The walls, roofs, and almost all parts of the church are artisticaly decorated, together with full-length paintings of the apostles, prophets, and other characters in Scripture history, as well as a large number of allegorical figures. The nave is divided from the chancel by an oak screen, which is decorated in gold and colours, whilst the roof and walls of the chancel itself are even more elaborately decorated, and the altar-piece, which rivals in its costliness and beauty the best works of Mediæval times, consists of richly-carved and gilt woodwork, with scenes from the Passion of our Lord, from His betrayal to the visit of the Marys to the sepulchre. The bishop is said to have expressed his strong disapprobation of these decorations as out of place in such an edifice, more especially the altar-piece, and refuses to consecrate the church until it is removed, with several other portions of the decorations. It is stated that the donor of the church declines to permit any of the decorations to be removed, and threatens to resort to measures to enforce the consecration of the church as it now appears. The cost of the edifice amounts to about 30,000*l*. It has been erected from designs furnished by Mr. G. F. Bodley, of London, architect.

To India in Four Minutes.—The opening of telegraphic communication direct with India has been inaugurated by the Prince of Wales, at Arlington-street, Piccadilly, in the presence of some seven hundred members of the scientific, the political, and the fashionable world, when the Prince conversed freely with the King of Portugal, the Khedive of Egypt, and the Viceroy of India; sending messages to and receiving answers from Lisbon, Cairo, and India, in the course of a few minutes. The communication was through the Falmouth, Gibraltar, and Malta, and the British Indian cable lines. When Lord Mayo's message came, soon after 12 p.m. in London, it was dated Simla, 5.4 a.m. His Excellency had been roused from his bed in the middle of the night,—"or to-morrow morning, isn't it?" as one inquirer remarked, confusedly,—to pass compliments with his Royal Highness and the gay crowd in Arlington-street. This was the climax of the meeting. Communication was also made, on the other hand, with the President of the United States; and had one been made with California, nearly the whole globe might have been girt in much less time than in forty minutes by the slow Fairies. The actual time occupied by the messages from India to London is said to have been four minutes and two seconds, but we suspect a *little* exaggeration here.

Railway Matters.—The Great Western railway authorities have provided comfortable barouche and Brougham cabs at Paddington, which ply for hire at the rate of 9d. per mile, or 2*s*. 6d. per hour.——Mr. Brassey, the contractor, is about to proceed with the construction of a railway from Berlin to Stralsund.——A new system of mountain railway has lately been laid down in Hungary. The line requires no permanent way at all. Square bearers of oak, 8 in. thick and 14 in. broad, are laid on the ground, and only at rare intervals cross sleepers are used. On the two edges of the bearers are rails only 2 in. broad, and so thin that they only weigh 1 lb. per foot. The trucks run on a pair of wheels 8 in. in diameter. The bodies of the trucks are three times the width of the rails, and placed so low on the wheels that they have just room to move. This system was originally proposed by an Englishman. The cost is about 200*l*. per mile.——The use of steel rails for railways is increasing. The "life" of a steel rail is reckoned to be five times as long as that of an iron rail, or, according to United States engineers, in all about forty years.

Value of Land at Stoke Newington.—Nearly five acres of freehold land, with a frontage to the Green-lanes, and an approach from Albion-road, were brought to the hammer in one lot by Messrs. Debenham, Tewson, & Farmer, and after a spirited competition the property was knocked down at 7,550*l*., or upwards of 1,5[illegible]0*l*. per acre.

Opening of a New Cotton Mill at Over.—The opening of a new cotton-mill at Over has been signalised by public rejoicings there. Like most mills, it is parallelogrammic in form, brick built, and covers six times the space of the old mill. It is six stories high, the large rooms being 105 ft. by 115 ft., and the others 60 ft. by 18 ft. The approach to the large rooms at the eastern end of the building, the one which will be used by the workpeople, is by a stone staircase in a projecting semicircular tower, which is about 71 ft. high, and rises some 4 ft. or 5 ft. above the six ridges of the slated roof. At the top of this tower is a cistern which supplies a lavatory on each landing, and would also be useful in case of fire. Besides the doors at the eastern ends of the rooms, there is a communication with the smaller rooms at the western end of the building, where there is also a stone staircase. The rooms are all well lighted, and for the purpose of ventilation the top row of panes of some of the windows form sashes which can be opened. Adjoining the main building are the engine-sheds, which will receive two pairs of engines of 120-horse power. Beyond these sheds is a circular chimney-stack, 19 ft. across the base, and rising to a height of 169½ ft., with a cap at the top 14 ft. in diameter. The total cost of the building and machinery will exceed 100,000*l.*, and it is hoped that employment will be afforded to 600 persons. The building was planned by the proprietor, Mr. Haigh, and erected by a Stoke contractor.

Royal Italian Opera, Covent Garden.—The new opera, "Esmeralda," has not been received by the musical press so warmly as it deserved to be, and the result is some little carelessness about it out of doors. The public are at times very unreasonable: they cry out for novelty, and when it is given neglect it. Signor Campana is not a Rossini or a Meyerbeer, but he has composed a very good and agreeable opera, including many charming things, and, set forth as it is by four such singers as Mdlle. Patti, Mdlle. Scalchi, M. Naudin, and Signor Graziani, the result is unexceptionable. The quartet in the first act, the air "*Son galante e capitano*," sung by Naudin, and "*E ver Son Zingara*," and "*Visse al Mondo un Capitano*," both sung by Patti, to mention no others, lift up the house to enthusiasm every night it is played. Mdlle. Patti was perhaps never heard to greater advantage. Some excellent scenery has been painted for the opera, which we have no hesitation in calling a genuine success.

The Sanitary Condition of Wigan: Government Complaint.—On Thursday, at a special meeting of the Wigan Public Health Committee, a letter was read from the Medical Department of the Privy Council, in which a very severe censure was conveyed with regard to the manner in which the sanitary regulations of the town are conducted. The letter stated that it was evident to their lordships that very serious sanitary defects were frequent in the district of the Board, which had, with very grave results, neglected its duty in some very material points, and it was recommended, therefore, that in future there should be a regular and frequently recurring inspection of the houses and domestic offices throughout the town, efficient and peremptory action against every nuisance that is discovered, the proper removal of excrementitious matter, and the appointment of a medical officer. After some discussion, the Board resolved to appoint a medical officer at 50*l.* per year.

Rochester Castle and Grounds.—It is understood that the ruins of Rochester Castle and the adjacent extensive grounds have been let to the corporation of that city, on a long lease, at a rental of 250*l.* per annum. The castle grounds will be immediately converted into a public park for the use of the inhabitants of the city, who have subscribed a considerable sum towards the preliminary expenses. It is to be hoped that nothing will be done to lessen the archæological value of the castle.

Sheffield Architectural and Archæological Society.—A small party of the members of this society had, on Tuesday, a very delightful excursion to Stow and Torksey, in Lincolnshire. At the former place the president read a paper on the history and architectural features of the venerable church, and the party afterwards adjourned, by invitation, to the vicarage, where they were most kindly and hospitably entertained by the vicar and his family.

Society for Improving the Position of the Labouring Classes.—The annual meeting of the members of this society was held at Willis's Rooms, under the presidency of the Earl of Shaftesbury. The report stated that the house for single men in George-street, Bloomsbury, comprised an average of eighty-five inmates. The Streatham-street, Bloomsbury, house for families, contained an average population of 222. The model lodgings in Portpool-lane, Gray's-inn-road; the Hatton-garden house for single men; the renovated lodging-house, Charles-street, Drury-lane; the renovated dwellings in Wild-court, Drury-lane; and Tyndall's-buildings, Gray's-inn-road, had received an increased number of tenants. The total amount received from all sources in 1869 amounted to the sum of 5,937*l.* 6s. 10d., and after providing for all items of expenditure there remained a balance of 697*l.* 18s. 10d. in hand. On the motion of the Rev. J. B. Owen, seconded by Canon Conway, the report was adopted.

Royal Academy.—On Tuesday night the annual *conversazione* was held at the Royal Academy. From half-past nine to half-past eleven the arrivals were incessant, and, according to precedent, the guests were received by the president, Sir Francis Grant. On occasions of this kind an examination of the pictures does not seem to enter into the philosophy of the friends of the Academicians, but from the entire absence of overcrowding, every facility was at hand for those who preferred to form an exception to the general rule. A *conversazione* on such an extensive scale would be incomplete without the attraction of music, and at frequent intervals throughout the evening a portion of the Grenadier Guards' band, under the conductorship of Mr. D. Godfrey, gave selections. Refreshments were served in the first suite of rooms, and the arrangements generally were admirable.

Bow-street Police-court.—Attention is very properly being called to the unsuitability of this building, in which the increasing business of the court is carried on, and which has been for years a subject for continual complaint. The only approach is a long narrow passage, about 6 ft. in width, and the complainants, witnesses, solicitors, and others attending on business have often to fight their way through a mob to get access to the magistrate. The only waiting-room for the public is a small apartment about 12 ft. square; and in this room prosecutors, defendants, witnesses, and professional men are expected to find accommodation. The necessity of a new court, with open yard for the prisoners' van, proper waiting-rooms, &c., was never more manifest than now, and, even on sanitary grounds, has become a public necessity.

The North Oxfordshire Archæological. This society met, on the 23rd ult., at Shipton, and proceeded by Swinbrooke and Asthall to Burford, where, after visiting the church and priory, bridge and old hostelry, they dined, numbering little less than twenty. Papers and discussions followed, closing a very successful meeting. Shipton-under-Wychwood (subtus Wychwood), on Domesday Scipton, in early times was a place of considerable consequence from its vicinity to Woodstock and Langley. In the latter (a chapelry to Shipton) at the time of the survey Edward Conppa had a mural mansion, one of the twenty belonging to Earl Algar. The remains of what is called King John's Palace are yet traceable.

Saltaire Almshouse Chapel.—A little chapel has recently been made out of one of the Almshouses, at Saltaire, in which it is intended to hold religious services on week days for the old people. It is situate on the north-west corner of the square, and has been fitted by order of Sir Titus Salt, and will hold comfortably about seventy persons. The place has been formally opened for divine worship, and a tea given by Mrs. Titus Salt, to fifty-one of the old almshouse tenants, besides others, including the Rev. Mr. Cowan, Sir Titus Salt, bart., and Lady Salt.

The Site of the New Law Courts.—In reply to Mr. W. H. Smith, Mr. Ayrton, in the Commons, said, as far as he could judge, the excavations for the foundations of the New Law Courts would be made at such an early period that it would not be practicable to make a thoroughfare for foot passengers from Carey-street to the Strand, for the temporary use of the public.

Incombustible Wood.—In the *Annales du Genì Civil*, Dr. Reinsah gives the following directions for rendering wood difficult of combustion and preserving it underground:—The wood, unplaned, is to be placed for twenty-four hours in a liquid composed of one part of concentrated silicate of potassa and three of pure water. After being removed and dried for several days, the wood is again to be soaked in this liquid, and after being again dried, painted over with a mixture of one part of cement and four parts of the above liquid. When the first coat of this paint is dry, the painting is to be repeated twice. This paint mixture should only be made up in small quantities, as it rapidly becomes dry and hard. Wood thus treated becomes uninflammable, and does not decay underground.

Opening of the New Synagogue at Rochester.—The new synagogue, erected at the cost of Mr. Simon Magnus, and already spoken of in the *Builder*, has at length been consecrated and opened by the Rev. N. M. Adler, D.D., Ph.D., the Chief Rabbi of the United Jewish Congregations of Great Britain. The architecture is Byzantine, and the materials are Kentish Rag, with freestone dressings. Throughout the synagogue a free use has been made of carvings, the objects delineated being fruit and flowers. The whole of the windows are of stained glass, and the floor is of Minton's tiles. Suspended from the sanctuary is a glass receptacle to contain "the Light of Memorial." The receptacle is a gift from Mr. Defries, in memory of his deceased wife, who was a daughter of Mr. Magnus.

Escape from Fire.—It is said that when a stable is on fire there is only one way of inducing horses to make their escape, and that is by throwing something over their eyes to blindfold them, when they can be led out with the greatest ease, just after they may have resisted every attempt to compel them to go. With many human beings, we dare say, in the excitement and terror of fire it is much the same case. Mr. E. Steane, of Barking, proposes—not exactly to blindfold them, but—to send them down from windows in a case or bag with an apron over the window-opening, the case being drawn to an easy angle below. His apparatus has a rope inside to aid the descent, and grapnels above and below wherewith to fix the apparatus.

Drain Ventilation in Bradford.—The Corporation of Bradford are about to make trial of a system of ventilating drains. The manner in which the ventilation is to be effected is by an 18-in. jointed metal pipe, the bottom end of which is inserted in the drain. The pipe is then carried up into the air to a great elevation, either by means of a shaft specially built for the purpose, or by fixing the pipe to the side of some building. It thus acts as a funnel by means of which the noxious gases and vapours generated in the sewer beneath are carried far up into the air and there escape, instead of rising from all the gratings and crevices above the drain.

A Trade Dinner.—The good old style of "mutual interests" with the employed and the employer, was pleasantly illustrated at the annual dinner of the "Hands" of Messrs. Morant, Boyd, & Blanford, of Bond-street, at the Crown Inn, Broxbourne, Herts, on Saturday last. The "Heads" cordially united themselves with the "Hands," and formed a body corporate, developing its energies in foot-races (handicaps) for silver cups, in which all ages took part; and at the very good dinner that followed, expressions of loyalty to the Queen were coupled with those of loyalty to one another's united interests in the continued success of the well-known and long-respected firm.

Metropolitan District Schools.—In the last Report of the Poor Law Board, Mr. E. C. Tuffnell, Inspector of Schools, notices a considerable increase in the number of children at the separate or district schools in the metropolitan district, and attributes it chiefly to the disposition of the guardians to avail themselves more extensively of the dispauperising influence of the large London schools. He says it is a very rare circumstance for any children brought up in them to fail to obtain an independent livelihood when launched into the world; indeed, the children trained in these establishments often succeed in dispauperising their relations. Not 4 per cent. fail to become independent workpeople.

Free Libraries.—The family of the late Mr. William Ewart, M.P., have presented to each of the forty free libraries in the United Kingdom, a portrait of their father bearing the following inscription:—

"WILLIAM EWART,
A Member of the House of Commons for thirty-eight years, between 1828 and 1868. He was one of the foremost promoters of the great political and social reforms of his time, and among many other important measures he originated and carried the Act which gave free libraries to the people of Great Britain and Ireland."

The portraits are delicately finished in monochrome on a photographic basis, and recall agreeably the presence of the deceased gentleman. They are by Mr. John Watkins, of Parliament-street, being replicas of one from life taken by him in 1859.

A Single-rail Tramway.—Mr. W. J. Addis, a civil engineer of Tanna, in the Bombay Presidency, has patented an invention for a single-rail tramway, and cart to work upon it, which, it is said, can be laid down—including four carts capable of carrying 3tons each—at a cost of about 5,000 rupees per mile. There are already two short tramways in operation, as feeders to the Great Indian Peninsula Railway. Two bullocks are said to be able on this line to draw from four to six times the load that they could do on an ordinary road, and with less labour and at a better pace. The prospectus of a company to make a line 109 miles in length, from Carwar to Hooblee, has been issued at Bombay.

Protection to Inventors.—A short Bill has just been introduced into the House of Commons in the interest of inventors. It is believed that many working men are discouraged from exhibiting their inventions at international exhibitions by their liability to piracy; and to provide for this a Bill has been introduced for the protection of any new invention which may hereafter be exhibited at any international exhibition which may take place this year, or at any international exhibition which the Board of Trade may, upon the application of any persons desirous of holding such exhibition, certify to be, in their judgment, calculated to promote British art or industry, and to prove beneficial to her Majesty's subjects.

Floating Sunken Vessels. — Messrs. Bewley, of Dublin, according to *Saunders's Newsletter*, have recently perfected an invention which may be of advantage to seaport towns and the shipping interest. Balloons are attached by divers to a sunken vessel. These balloons are composed of strong vulcanised india-rubber. At the same time tanks are lowered, in which there are filings of zinc and sulphuric acid; and by liberating a valve the zinc filings fall down into the acid, and the hydrogen produced inflates the balloons, with which, of course, the tanks must be connected, and the vessel rises to the surface. Several large ships, it is said, have already been lifted by this means.

Birmingham Architectural Society.—The council of the Birmingham Architectural Society have invited pupils and assistants, under twenty-five years of age, in the offices of members of the society, to send in sketches and drawings of interesting buildings, and other architectural subjects, for which they will award premiums, viz., five guineas for the best, three guineas for the second best, and two guineas for the third best set of drawings, the merits of which will be determined by the council of the society. The subjects for sketching are portions of Aston Hall, and the Collegiate Church of Wolverhampton; the selection of which portions is left to the judgment of the student.

The Industrial Art Museum at Birmingham.—The movement begun on Monday, to provide a Museum of Industrial Art in Birmingham, under the care of the corporation, is making very satisfactory progress. We (*Birmingham Post*) have already announced two donations of 100*l.* each, for special purposes, and we have now the pleasure of stating that Messrs. Elkington & Co. have most liberally given 100*l.* to the general fund. Several other donations have been forwarded to the secretaries, Mr. Mullins and Mr. Smith.

St. Paul's Cathedral.—A correspondent proposes that a part of the decoration of St. Paul's, such as a window or carvings, should take the shape of a memorial to the late Dean Milman, and thinks many would subscribe to that who might not care to subscribe for the building merely.

The Proposed New Promenade, Hull. A liberal offer has been received from Mr. Strickland Constable, the owner of a considerable portion of the land lying between the Anlaby and Hessle roads, and which will be required for the purpose of making the intended promenade between the Hessle-road and Springbank, offering to give the land required of him, and 1,500*l.* in addition, on condition that the Board of Health make the road, and complete a portion of it, within twelve months.

The Trades Movement in France.—Many of the trades in France are now again suffering from the strikes of the workmen: carpenters, ironfounders, and workers in metals generally all over the country are asking for higher wages. The men say that the increased cost of living and lodging compels those demands. There is truth in this assertion; but French workmen have got into a bad habit (their own countrymen say) of wasting two days of the week in idleness.

Buildings in Redruth.—The building trade in Redruth has not been so brisk for years past as it is at present. A large workshop is in course of erection for the Messrs. Clarke & Co., and a shop at the east end for Mr. Anthony Luke. The Messrs. Trounson's shop is now rapidly approaching completion. The tender of Mr. Thomas Jenkin, of Devonport, for enlargement to Mr. Lanyon's house, has been accepted at 895*l.* The whole of the works are being carried out from the designs and under the superintendence of Mr. James Hicks, of Redruth, architect.

Stoke Newington Green.—The Parks and Open Spaces Committee of the Metropolitan Board of Works have under consideration the improvement of this green. There are many literary and historical associations connected with the place. The house in which the late Samuel Rogers, author of the "Pleasures of Memory," was born is still in existence there. It is in contemplation to erect by subscription a statue of De Foe, who was educated and afterwards resided at Newington-green.

Steam Road Roller.—At the exhibition of machinery, held last week at the large town of Lille, Messrs. Aveling & Porter were awarded the large gold medal for their 15-ton steam road roller.

Dulwich College.—The roofs of the new buildings are covered with patent tiles, supplied and laid by the Broomhall Tile Company, glass tiles being inserted where light is required.

TENDERS.

For alterations to Yorkshire Grey Tavern, Piccadilly, for Mr. Joseph Henderson. Messrs. Bird & Walters, architects. Quantities supplied:—

Williams & Son	£579 0 0
Brown & Robinson	553 0 0
McClacklan	552 0 0
Watson Brothers	540 0 0
Sprague	537 0 0
Saunders (accepted)	485 0 0

For rebuilding No. 343, Oxford-street, for Major Gossett. Mr. Jennings, architect. Quantities supplied:—

Fish	£1,660 0 0
Woodrough	1,606 0 0
Watson Brothers	1,594 0 0
I'Anson	1,576 0 0
Longmire & Burge	1,539 0 0
Harding & Roberts	1,519 0 0
Cook & Green	1,431 0 0

For private improvement works, at Much Woolton, Lancashire. Messrs. Reade & Goodison, civil engineers. Quantities supplied:—

Morrison	£1,849 13 3
Jones & Doyle	1,772 11 0
Sewell	1,534 18 0
Lee	1,497 10 0
Hardacre	1,482 12 3
Standing & Littler	1,410 9 6
Fawkes & Maude	1,321 18 2
Radcliffe	1,225 9 0
Mitchell	1,221 17 8
Hartley & Parkinson (accepted)	1,129 1 1

For building addition to St. Paul's Schools, Broke-road, Dalston, for the Rev. W. Stone, M.A. Mr. Wm. Mundy, architect:—

Conder	£440 0 0
Eaton & Chapman	447 0 0
King & Sons	435 0 0
Blackmore and Morley	415 0 0
Brown & Sons	390 0 0

For rebuilding premises, Tooley-street, Southwark, for Messrs. Brook & Roberts. Mr. V. J. Grose, architect:—

Keeble	£2,766 5 0
Greenwood	2,690 0 0
Little	2,639 0 0
Cooke & Greene	2,478 0 0
Kent	2,397 0 0

For drainage works at Sawbridgeworth, for Messrs. Russ & Minns:—

Killingback	£558 0 0
Carter	491 0 0
Morton	466 10 0
Swinford	458 10 0
Wybush	450 0 0
Harris	428 0 0
Cole	426 14 0
Pizzey	426 8 3
Jackson	425 0 0
Stevens	420 0 0
Browne	389 0 0
Woodcock	386 0 0
Glasscock	385 0 0
Potter	383 0 0
Young	375 0 0
Bloomfield	372 0 0
Bugbird	369 10 0
Goodair	348 10 0
Prior (accepted)	319 10 0

For the erection of a Corn Exchange and Vegetable Market for the borough of Doncaster. Mr. William Watkins, architect. Quantities supplied by Mr. E. S. Brundell:—

Builder's Work.—Contract A.

Simpson & Malone	£16,927 0 0
Henshaw	16,790 0 0
Stephenson & Western	16,720 0 0
Booth, Illingworth, & Sons	16,200 0 0
Powell	15,516 0 0
Whiteley	14,713 12 4
J. & W. Beanland	13,977 0 0
Neill	13,800 0 0
Mathews	13,732 0 0
Dennett	13,656 0 0
Kirk	13,655 0 0
Butler	13,550 0 0
Kirk & Parry	13,540 0 0
Nicholson & Son	13,500 0 0
S. & W. Pattison	13,500 0 0
Storrs	13,399 0 0
Bellerby	13,284 0 0
Barry	13,250 0 0
Thornton	12,966 9 8
Pearson & Son	12,810 0 0
T. & C. Anelay	12,578 0 0
Keswick	12,550 0 0
Warburton Bros.	11,653 0 0
T. & H. Askew	11,632 0 0
Waring Brothers	11,562 0 0
Athron (accepted)	11,173 0 0
Weatherley & Rymer	11,005 0 0

Smith and Ironfounder's Work.—Contract B.

Westwood & Bailey	£3,260 3 0
Butler & Pitts	2,976 0 0
Harrison	2,834 0 0
Kirk	2,720 0 0
Tildersley	2,696 0 0
Haywood	2,687 0 0
Kirk & Parry	2,674 0 0
S. & W. Pattison	2,670 0 0
Powell	2,633 0 0
Cliff & Co.	2,600 0 0
Pearson & Son	2,580 0 0
Close, Ayre, & Nicholson	2,562 0 0
Henshaw	2,550 0 0
Crosley	2,533 19 0
Newton, Chambers, & Co.	2,500 0 0
Nelson & Son	2,460 0 0
Woollier	2,400 0 0
Whiteley	2,390 0 0
Handyside & Co.	2,374 0 0
Hill & Smith	2,356 19 7
Ratcliffe & Nuscheler	2,355 0 0
Jukes, Coulson, Stokes, & Co.	2,288 0 0
Niell	2,130 0 0
R. & J. Rankin (accepted)	2,096 0 0
Cornell	1,960 0 0

For fitting up a hippodrome, in Argyll-street, Regent-street, for Mr. F. Hellewell. Messrs. Elliott, Cree, & Bernard, architects. Quantities supplied by Mr. Bagg:—

Winterton	£2,907 0 0
Richards	2,799 0 0
Conder	2,714 0 0
Sharpington & Cole	2,655 0 0
Reading	2,616 0 0
Lewis	2,600 0 0
Rudkin	2,525 0 0
Garrud	2,430 0 0
Jackson & Shaw	2,410 0 0
Killby	2,375 0 0
Shurmur	2,096 0 0
Blease	1,787 7 0

For shop and house, adjoining Camden-road Station, North London Railway, for Mr. J. R. Bonny. Mr. R. D. Horne, architect:—

Manley & Rogers	£1,597 0 0
Mansfield, Price, & Co.	1,560 0 0
Wheeler	1,450 0 0
Hill, Keddell, & Waldram	1,440 0 0
Scrivener & White	1,396 0 0
Sewell & Sons	1,393 0 0
Wicks, Bangs, & Co.	1,347 0 0

For Child's Hill Chapel. Mr. Wm. Allen Dixon, architect:—

Mann	£1,420 0 0
Brown & Robinson	1,336 0 0
Eaton & Chapman	1,254 0 0
Higgs	1,234 0 0
Manley & Rogers	1,226 0 0
Wicks, Bangs, & Co.	1,167 0 0

For the erection of a building at the corner of Swithin's-lane, Cannon-street, E.C., for the Estate Company, Limited. Mr. E. A. Gruning, architect. Quantities supplied by Messrs. W. R. Gritten & Son:—

Ashby & Sons	£7,928 0 0
Holland & Hannen	7,897 0 0
Trollope & Sons	7,863 0 0
Hill, Keddell, & Waldram	7,490 0 0
Brass (accepted)	7,483 0 0

For a pair of semi-detached cottages, at Tuston, Oxford, for the Hon. Miss Dillon. Mr. J. B. Spencer, architect:—

Honour & Castle (accepted)	£407 0 0

For the erection of two pairs of cottages, at Upton, Bexley, Kent. Mr. Horace A. Alexander, architect:—

Wevell	£1,100	0	0
Rudkin	1,100	0	0
Mason & Bristy	1,053	10	0
Pearce	958	0	0
Sharp & Son	955	0	0
Porter	854	0	0
Emery	800	0	0
Chappell	788	0	0
Green	770	0	0
Lonergan	760	0	0
E. & J. Butler	749	0	0
W. H. & J. Manabridge	692	0	0
Bourne	670	0	0
Basham Brothers	660	0	0

For the erection of galleries, &c., in Hirbury Congregational Church, Notting-hill. Messrs. Satchell & Edwards, architects:—

Cowland	£751	5	0
Higgs	749	5	0
Hockly	715	0	0

For building a chapel for the Independents, Maesteg, South Wales. Mr. T. Thomas, architect. Quantities supplied by Mr. G. W. Ranwell:—

Leyshon (accepted)	£676	0	0

For building extra story and decorations to the house No. 4, Chester-terrace, for Mr. H. Oxenham. Messrs. Mayhew & Knight, architects:—

Vernall	£516	0	0
Watson Brothers	473	0	0
Barratt	430	0	0

For alterations to front of house and stables, No. 16, Devonshire-street, Portland-place, for Sir Kingston James. Mr. W. A. Baker, architect. Quantities supplied by Messrs. Richardson & Waghorn:—

Hopkins	£241	0	0
Watson Brothers	217	0	0
Simpson & Son	214	0	0
Philips	212	0	0
Clark & Mannooch	197	0	0

For the erection of a new wing, conservatory, stabling, &c., and alterations to house at Herne-hill, for Mr. John D. Welch. Mr. W. H. Powell, architect. Quantities supplied by Mr. H. J. Harris:—

Downs	£2,700	0	0
Colls & Sons	2,638	0	0
Mansfield, Price, & Co.	2,600	0	0
Manley & Rogers	2,577	0	0
Jackson & Shaw	2,520	0	0
Brass	2,488	0	0

For the erection of Dispensary and Relief Offices, &c., near the Dalston Junction Railway Station, for the guardians of the parish of Hackney. Mr. Wm. Lee, architect:—

Crabb & Vaughan (accepted)	£4,781	0	0

For the erection of the Surrey Drovers' Inn, Croydon. Mr. John Berney, architect:—

Waller	£1,645	0	0
Hyde	1,630	0	0
Crabb & Vaughan (accepted)	1,534	0	0
Wright Brothers	1,525	0	0
George	1,487	0	0

TO CORRESPONDENTS.

W. K. A. (the right notice was not sent before: one of an entirely different kind. If a little pains had been taken, much inconvenience might have been saved, and more information given).—A County Magistrate (we should suggest the use of the tin-lined lead-pipes mentioned in our last, p. 512, *ante*).—E. S.—W. W.—E.—Messrs. S.—T. W.—J. J. A.—J. W. G.—C. F. H.—G. L.—P. & Sons—J. W.—E. C. & R.—G. & Co.—E. A. G.—H. C.—J. McD.—N. H. J. W.—A. & P.—W. M.—F.—J. R.—J. P.—W. H. K.—S. & R.—J. A. R.—T. . H.—V. J. G.—H. A. A.—J. W. R.—W. J. G.

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